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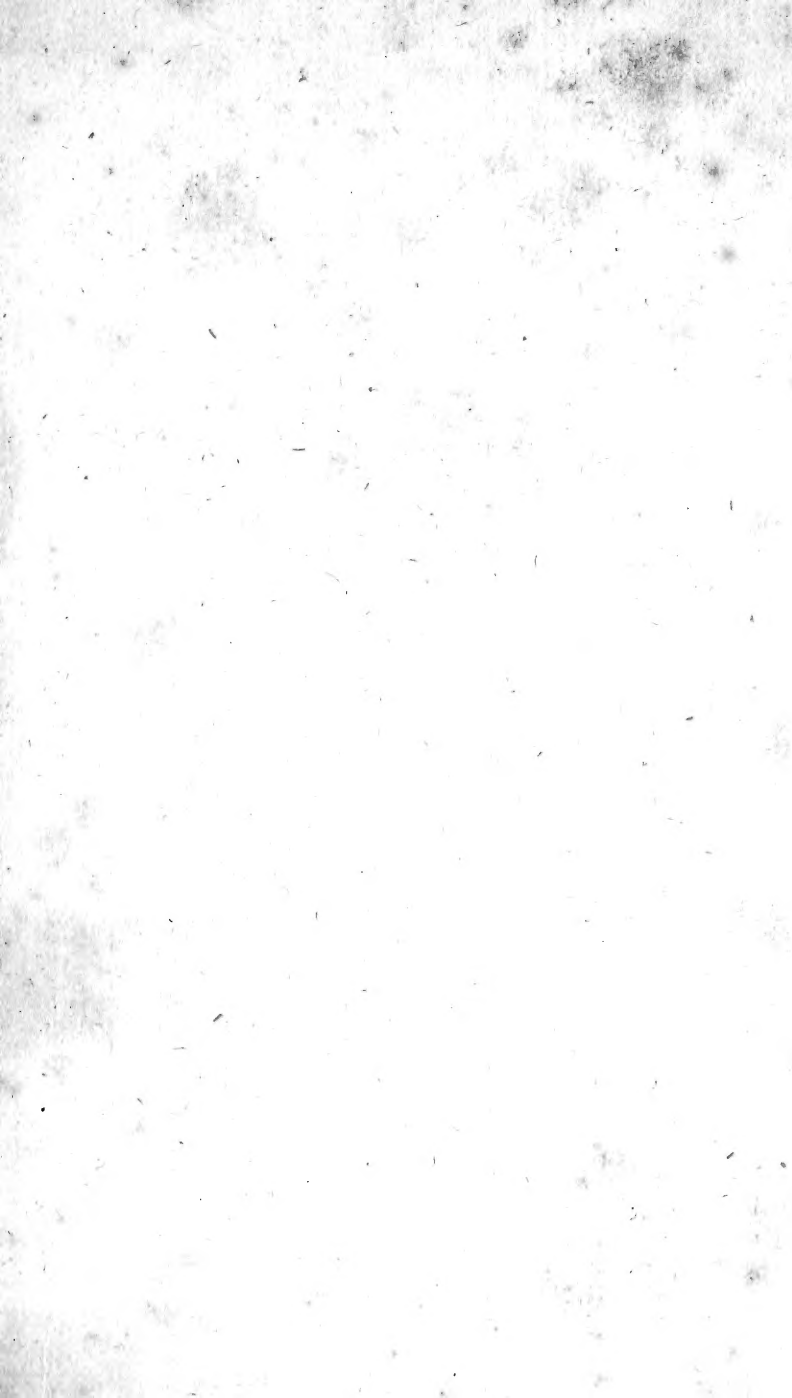
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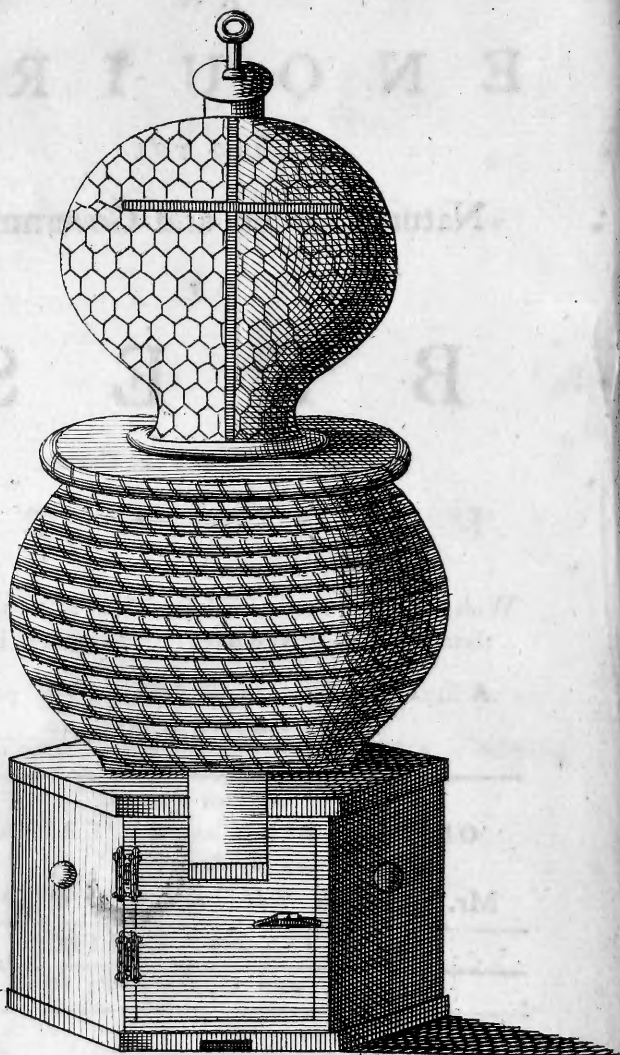
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The Drone. The ^{Queen} Queen. The Honey Bee.



T. Loveday Sculp.

A N
E N Q U I R Y
I N T O T H E
Nature, Order, and Government
O F
B E E S,

Those INSTRUCTIVE and USEFUL
I N S E C T S.

With a New, Easy, and Effectual METHOD to preserve
them, not only in COLONIES, but common HIVES.

A SECRET unknown to past Ages, and now published
For the BENEFIT of MANKIND.

Written upon
OBSERVATION and EXPERIENCE,
By the REVEREND
Mr. JOHN THORLEY, of OXON.
THE SECOND EDITION.

Illustrated with COPPER-PLATES.

L O N D O N:

Printed by J. WAUGH in *Lombard-street*, and Sold by N. THOR-
LEY, at the *Lock and Key*, facing the *Mansion-house*.

M. DCC. LXV.

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T495 Balcony
1765

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TO THE
R E A D E R.



Rguments deduced from Nature and Scripture do demonstrate the being and perfections of God, convince men of the natural and indispensable obligation of moral duties, and persuade them to religious practice; and if what is proposed and urged in the following history of Bees, prove effectual for the preservation of millions and myriads, of such excellent, exemplary and useful creatures, the author's pains in the composition will be abundantly recompensed.

IV TO THE READER.

IT is not material, neither would it be of service to tell the world, what led me at first into such an acquaintance, (though very remarkable) with these little creatures, whose wonderful parts and properties are so many evident proofs of the infinite power and wisdom of the Creator.

THEY have ever since been an agreeable amusement to me, and the delightful employment of my leisure hours.

BUT as I never was ambitious of being an author, I should not have published these sheets, were I not well satisfied that the public good would be promoted, and these profitable creatures preserved to their owners, which are now annually destroyed, through want of knowledge in the management of them.

I HAVE carefully perused several of our *English* writers of the greatest esteem, obviated many of their errors, and collected what I apprehended most material and useful in them.

PROVIDED the reader will but diligently attend to, and pursue the directions given in the latter part of the book, for preserving the lives
of

of these delightful, profitable insects, at the same time that he puts himself in full possession of the treasure they have with so much pains and labour gathered together, he will assuredly find, what the title page promises, in every particular perfectly accomplished; without the least reason to complain of any abuse or imposition.

AND would but the owners of Bees in *Great-Britain* and *Ireland* unanimously enter into the measures here recommended, a few years practice and experience would undoubtedly shew how much this way of management would promote, not only their own private advantage, but the riches of the kingdom; and there would be less occasion for such large importations of honey and wax every year from other parts of the world.

BUT if neither private nor public interest, separately or in combination, can influence and persuade, I conclude it would be altogether ineffectual and vain to try other arguments.

THAT a design for the public good, the preservation of these most valuable insects, may be acceptable and successful, not only through the

British dominions, but in all neighbouring kingdoms, and the most distant parts of the globe, is the earnest wish, and the humble expectation and hope of

Your very faithful Friend,

And most humble Servant,

*Chipping Norton, in Oxfordshire, November the
24th, 1743.*

JOHN THORLEY.

TO THE

P U B L I C.

THE Editor having for many years pursued the instructions of his father, (who is the Author of the following History) hath made some improvements in the art and management of Bees ; particularly a Glafs-hive, as represented in the plate fronting the title-page, one of this construction was filled with fine virgin-honey, and being an useful curiosity, was purchased by the Society for the encouragement of Arts, Manufactures and Commerce, who also purchased one of his colonies, that they might be inspected by the curious, and brought into general use : persuaded that the invention would prove of the greatest advantage to this country, they offered a premium of two hundred pounds, in order to introduce Mr. *Thorley's*, or some other method of

a similar kind, whereby much larger quantities of honey and wax might be procured, and at the same time the lives of these useful insects preserved.

UPON their general approbation of the method laid down in the following sheets, and seeing the beauty and usefulness of the invention of the Glafs-hive, the Editor was honoured with the following letter from the Learned and Polite Dr. *Templeman*, Secretary to that respectable and useful Society, by order of the worthy members, who have been pleased to offer the following Premiums, to encourage the best method of preserving the lives of Bees.

S I R,

S I R,

I have the pleasure to return you the thanks of the Society for the lights and information with regard to the culture of Bees, which you have been so obliging to communicate to them.

PERMIT me, at the same time, to send you my acknowledgments for the favour you did me, by putting it in my power to give a taste of your honey to several of the members, who all agree that it was the best they ever tasted of *English* growth. I am, with the greatest respect,

S I R,

Your most Obliged,

Humble Servant,

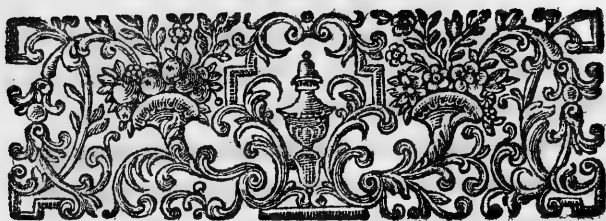
Strand, January
22d, 1765.

PETER TEMPLEMAN.

A PRB-

A PREMIUM of Five Pounds will be given to every person who shall have in his possession, on *February* 1st. 1766, being his own property, any number of stocks of living Bees, in hives or boxes, not less than thirty; but in case there should be above forty claimants, then the sum of Two Hundred Pounds shall be distributed between the candidates, in proportion to the number of claimants.


A PREMIUM of Five Pounds will be given to every person who shall take Ten Pounds of merchantable wax, from any number of stocks of living Bees, in hives or boxes, who shall preserve their lives till the first of *March* 1767; but in case there shall be above forty claimants, then the sum of Two Hundred Pounds shall be distributed between the candidates, in proportion to the number of claimants.



THE
HISTORY of BEES.

CHAP. I.

Of their Nature and Properties.

“ATURE, the largest, most learned, and
“ perfect volume, every leaf in it shining
“ with the fullest, clearest indications and
“ displays of the divine perfections, affords
“ all men matter of useful speculation, and may be stu-
“ died with the utmost pleasure, and greatest advantage.”

— How entertaining and ravishing a subject was this to the Royal Psalmist? *How manifold are thy works, in wisdom hast thou made them all!* If things inanimate gave him such an inexpressible pleasure, how much more delightful must the contemplation be of creatures which have life! *A living dog (says Solomon,) is better than a dead lion.*

And

And we find this great naturalist applying himself to the study of creatures very inconsiderable and contemptible, even ants, and other insects.

Not only the noblest of subcelestial beings, which occupy the higher posts in creation, but also the minutest creatures, in their wonderful forms and structures, various relations and references, mutual subserviencies and dependencies, uses, intentions and designs, are sufficient to teach us; therefore demand our most diligent and serious attention.

As all these are the certain productions of Divine Power, so are they the constant care of Divine Providence.

It is not beneath, or unbecoming the Divine Majesty, to take care of the creatures he has made.

If it be an honour to make these, why should it be thought by any a disgrace to take care of their safety and welfare?

It is impossible that any creature should be independent, or subsist without a divine agency; therefore we must conclude the divine superintendency entirely unconfined, and extending itself to the meanest insect, as well as the greatest monarch.

He who clothes the grass, takes care also of oxen, feeds the ravens, and a sparrow falls not to the ground without him. The eyes of all the living wait on him, who gives them their meat in due season.

But how infinitely condescending and indulgent has he been to the human species, in appointing and providing

ing so great a number and variety of inferior creatures, (beasts, birds, fishes, &c.) not only for necessary uses, but also for pleasure and delight.

In this number the subjects of the following History, in many respects serviceable to mankind, may very justly be included.

Their nature, and surpassing excellencies, are the subject of the present enquiry.

How mean soever they may appear to the major part of mankind, I hope to make it evident, to every attentive and ingenious reader, that they are in reality the most noble and excellent, most charming and valuable of all insects.

As such, they have for several successive centuries employed many learned pens, both of philosophers, physicians, divines, and others, though of very different sentiments; who have favoured the world with their various remarks, and useful reflections; but in my humble opinion very defective in one point of great importance; since I find not any of these authors, (ancient or modern,) have given directions to the owners of these admirable insects, how most effectually to preserve the lives of such profitable collectors, while they appropriate their treasure to their own use.

Thus at once to despoil them of their riches, and sacrifice their lives, is barbarous indeed!

* *Dr. Butler* mentions other things, besides sulphur, to lay Bees asleep; yet not with any design to preserve their lives, but only to possess their treasure.

It

14 THE HISTORY OF BEES.

It is no difficulty, by a proper opiate, to lay them in a deep sleep, as will be shewn hereafter; but when that is effected, where, or how shall we dispose of them, or provide for them a convenient and agreeable habitation, with sufficient supply for their maintenance and defence till the next gathering season?

For this the reader will find very full and particular directions towards the close; by a diligent and careful observance of which, with a few trials and experiments, he will quickly commence *Master of the art*.

In that innumerable multitude, and surprizing variety of insects in the world, made for the service of man, Bees are most to be admired; there are none that can equal, much less excel them; as by their painful labours, and plenteous collections, they contribute and minister not only to the necessary supports, but also to the pleasant and delightful accommodations of life.

I most willingly allow the Silk-worm in her manifold changes and transmigrations, to be a very wonderful creature, and, as such, may pass for a miracle in nature.

But let it be remembered, she is of service only in one particular, even providing raiment, and that not of equal necessity with the Bees productions.

The service of these is much more extensive, furnishing us with more necessary things, *viz.* food and physic; one to support nature, the other to heal its disorders.

The Silk-worm accommodates us with cloathing for the body; but the Bees help both to nourish the body,
and

and to heal it : the one is for ornament, beauty and decency ; the other for health and necessity.

Pliny insists at large upon this argument, and proclaims their excellency in these words * : *Among all insects Bees are the principal, and justly merit the greatest admiration and regard.*—“ As Bees serve for necessary uses, to
“ feed the belly and heal the body, they deserve to be
“ loved and defended of all †.”

But their nature and superior excellencies will more fully appear from their following exemplary properties.

Of their Loyalty.

THEIR great Loyalty to their Sovereign, (being all under the government of one monarch) are perfectly surprizing and astonishing ; without precedent or parallel, all royal orders and commands are most readily and fully executed, chearfully and constantly obeyed, whether in swarming, in killing the drones, or fighting with their enemies, &c. nor is there a single rebel in all the community.

They are fond of the person of their Queen, whose presence is absolutely necessary to the prosperity and safety of the whole. Their Principal lost, proves the certain and total destruction of the state, except the owner supply them in time with another governess.

Such is their affection and love, that, on every just and proper occasion, they will freely offer, and unanimously

* *Inter omnia insecta principatus apibus, et jure præcipua admiratio.*

Lib. 11, c. 5,

† *Dr. Butler's Fæm. Monar.*

mostly determine, to sacrifice their own lives in defence of their adored Sovereign's.

Without their head or chief they cannot rest, be easy, or in quiet, though in the midst of the greatest affluence and plenty; but are so while with their Principal, even in the deepest, most distressing poverty, and will languish and die rather than depart from her.

In June 1715, paying a visit to an honourable Lady in *Gloucestershire*, and taking a walk after dinner in the garden, she told me one of her stocks had swarmed that day, and were hived; I examined the hive, and finding, as I expected, only a few Bees in it, I advised her to return them to their fellows, where they would be of more service than if kept separate and by themselves. By her Ladyship's permission I knocked one part of them down upon the grass, and the remainder at a little distance from the first, taking that opportunity to seize the leader, which was easily effected. I carried the beautiful creature to the Lady, and other company then present. After a full view, they were all convinced this was the Sovereign. Having clipped the wings, I laid her down at a little distance from one of the squadrons, which were in perfect tumult and confusion, running to and fro, and spreading themselves about the grass, searching for their lost Sovereign.

When they found their leader, they gathered all together, greatly rejoicing.

I afterwards moved this Bee from place to place several times, till, by marches and countermarches, all the
company

company saw these most loving, loyal creatures, would by no means forsake their Queen.

To prevent the ruin of the rest I took her away, returning her no more; and after a fruitless search for some time, they all fled back to the old hive; otherwise both the Sovereign and subjects would most certainly have perished together, as I have frequently observed in like cases.

A young gentleman seeing the Bees crowding and clustering about their Queen, when returned, concluded she was killed in the tumult, but was quickly convinced of his mistake; for taking her from the multitude, he saw her as strong and vigorous as ever.

In *September 1743*, a large parcel of Bees, having spent all their store, entering into my grand Apiary, and attempting to force themselves into one of my hives, and meeting with a most vigorous opposition, wherein considerable numbers were quickly slain, the residue settled under the pan and hackle, where they continued with the commandress several days, pining and perishing together. Such instances are full proofs of their loyalty.

When their Sovereign is lost, nothing is seen among them but tumult and confusion, nothing heard but mourning and lamentation; whereon they either totally abandon the hive, yield to robbers, or leave the treasure to the owners.—But in case the same is again found, how delightful is it to observe, with what transports of joy, and triumphant melody, she is embraced and welcomed,

13. THE HISTORY OF BEES.

and the whole empire is re-established in perfect tranquillity!

May they not be our instructors? Why should death, in its most dreadful form, ever separate the Christian from his adored and most beloved Lord and Saviour? Should it not shame Christians to be outdone and condemned by creatures, which have neither reason nor conscience to conduct their actions.

Come, likewise, Oh! all ye *Britons* and *Hibernians*, and learn your duty to your only rightful and lawful Sovereign KING *GEORGE*.

These Insects, then, never rise in arms against their Sovereign.

Their Unity.

A BEE without her company is an insignificant, impotent, helpless, useless creature; cannot work nor propagate her species, nor secure herself from numerous enemies and evils. But what noble, excellent purposes do they serve, thus incorporated, and by a social spirit thus strictly united together, jointly pursuing the public profit and advantage!

They are all one, not only in love and loyalty, but also in work and labour, mutually and alternately performing all manner of offices without distinction, as natural instinct teaches them; and in case of invasions, they all join their forces in defence of their Sovereign, their dear offspring, and treasure.

Every

Every flock of Bees, or colony then, may be considered in this view, as a commonwealth; their habitation is in common, food and provision in common, their labours all in common, their care of posterity in common, and they sympathize with one another in common danger, and with the greatest courage and resolution fight for one another.

By their united endeavours they produce that affluence and plenty that constitutes the riches of the whole society, and of every individual.

Thus do they live in perfect peace and perpetual unity, to which the prosperity and safety of the state is entirely owing; for civil wars, domestic quarrels and divisions, would infallibly overturn, and entirely subvert the government.——Who knows not the fatal consequences of divisions, whether in families, cities, churches, or kingdoms?

If soul and body are once separated, the man dies. If a city or house be divided against itself it comes to desolation; and a kingdom divided against itself cannot stand.

These little creatures, thus firmly knit together in sincere affection, and combined in power, appear effectually secured from all assaults and enemies, excepting the fire and sulphur of their cruel masters.

How happy would it be for *Great Britain*, if all the subjects of KING *GEORGE* were as firmly united in fidelity and affection, and as true to one another!

Of their Courage.

THEIR valour and magnanimity is equal to their loyalty. I know no creatures that in resolution and courage equal these. They are so bold, daring and intrepid, that nothing can intimidate them: not an army in martial order, with sounding drums and trumpets, and roaring cannon, those messengers of death. Once engaged they fear no enemies; they regard no person: nor will they ever yield, till disabled or destroyed; they will conquer or die.

It is perfectly surprizing to see so much resolution and courage in such little, contemptible insects. They have small bodies, but great spirits, and great wrath. “Exasperate them near their hives, in their busiest time of labour, and you may as well take a bear by the tooth, or offer to bind a lion with a single thread or hair, as by resistance and opposition to compose and quiet them.”

Should any man question the truth of this, he may quickly resolve the doubt, and too late repent his foolish rashness and presumption.

About twenty years ago a friend of mine, at a neighbouring village in this parish, in the month of *June*, saw a swarm of Bees entering into an high ash-tree, which was hollow, growing in the common field near his house; no person laying any claim, or pretending any right to them, he was desirous to gain them for his own property.

When

When I understood their situation, and how they had possessed themselves of so strong an hold, and to all appearance impregnable, I represented to him not only the uncertainty and improbability of success, but also the great hazard he would run in so desperate an attempt, and that I would not be answerable for the consequences.

He immediately prepared himself for the encounter, putting on his hands a very thick pair of mittens, (used in making fences,) and a cloth over his head, with a thin veil upon his face, having before collected a sufficient quantity of nettles, as directed.

Every thing thus in readiness for a storm, I chose a post at a convenient distance, and where I could be safe from the sword of the enemy, determined to wait the event, and see to which side the event would fall.

He engaged on very great disadvantages; the strength of the castle, and the number of the garrison many thousands to one, and where every common soldier was a perfect hero, that would sooner die than yield; yet thus did Mr. *Wiseman*.

Up the scaling ladder goes my champion, very meanly armed, as before; and with a brush of nettles in his right hand, thrusts his arm up the cavity, swept them out at the passage, when immediately they were about his head as thick as hail, maintaining his post, till he had with the rest of the nettles stopped the passage so close that a Bee could not re-enter.

This done, down he came surrounded with the enemy, resolved to revenge so great an injury, though with

the loss of their lives. They fell upon him with the greatest fury imaginable, but I durst not offer him any assistance or relief.

They charged him in flank, front, and rear; clung to him, like ivy to the tree; got under his covering, into his hair, and under his cloaths, and stung him from head to foot.

It was a considerable time before the battle was ended, and he had entirely disengaged himself; at which time I suffered him to come to me, when hundreds of stings stuck in his hat, mittens, &c. besides a considerable number left in his body, the poison of which presently inflamed his blood, and threw him into a violent fever, which threatened his life. The fever increasing, his life hung in suspense for at least two entire days: toward the close of the third day it began to abate, and being a man of a strong and vigorous constitution, he recovered, and in a few days more was perfectly well, to the great joy of his family, and other friends.

Some time after the battle, the scattered troops being re-assembled, rose and settled upon a little branch of the tree, which I gently cut down, putting them into a hive prepared for them, when not so much as one single Bee shewed the least resentment.

I was of opinion, that near one third was destroyed in the engagement; yet they gathered that Summer sufficient to maintain them the following Winter, and for some years did well, though a very dear purchase.

The more you resist, the more you enrage them, and when once provoked and engaged, they scorn to capitulate,

late, to enter into a treaty, or yield to a truce. The most prudent way is quietly to retire, in order to pacify them, and keep at a distance till the affront is forgotten.

The same courage and resolution is seen in their mutual quarrels and wars, wherein they neither give nor take quarter, not ceasing their conflicts till at least one party is subdued.

Of their Industry.

IN painful, profitable labours, sure no creatures can be more constant and indefatigable, and no less chearful are they herein than constant. They have a natural inclination hereto, and nothing is more odious to them than sloth and idleness. Labour is their very nature, and greatest pleasure; an hungry or a thirsty man doth not eat or drink with greater delight, than these admirable, amicable creatures, follow their appointed works, and proper employments. This is their beloved province; and now they appear to be in their proper element. With the greatest satisfaction and admiration have I frequently beheld them, most faithfully, and as chearfully discharging their several offices, without loosing the least opportunity. Restraint at such a season would make them impatient, and confinement would be an intolerable punishment.

It is to these their united, most earnest, constant labours, their prosperity and riches, are principally owing.
The diligent hand maketh rich.

They are incessant, as well as abundant herein, desist not, nor require a writ of ease, while ability lasts, and the season permits and encourages, oftentimes venturing abroad with their wings rent and tore, in manifest hazard of their lives, and never return.

Though their labours are but of little more duration than six months in the year, yet they may justly be accounted the most industrious creatures upon earth; the discontinuance of their labours for so long a season being owing not to their natural temper, but only to their want of opportunity. They begin to work as early as the flowers appear, to furnish them with suitable and necessary materials, and they desist not till these cease.

And in a honey-dew, in what a surprizing manner do they bestir themselves! employing all the forces that can be spared abroad, when every Bee returns with its load, adding to the publick treasure, with all possible diligence and earnestness laying in sufficient store against a spending time they foresee approaching. The Winter is long, their enemies are numerous, and many months they want meat, the utmost efforts are therefore necessary to prevent an universal ruin and destruction. They most earnestly strive; it is for their life.

And if they are late swarms, and the weather also discouraging, (as the end of the last Summer) the greatest diligence possible may be insufficient to preserve them. Scarce one in ten of the last year's swarms, which came late, could stand.

I have not above three left out of twenty-four. The continued and excessive rains, which damaged the corn,
either

either washed away the mellifluous juices, or prevented their gathering, or both, and so occasioned the said losses. Yet the Bees are in safety, united with other stocks.

Thus constant are they in their honest labours, from morning till night; and when the day is gone, their work is not done: they labour in the night, in building combs, (if they are new swarms) or in filling the magazines with honey, or sealing the cells, ministering more nutritive matter to the young brood, killing the drones, &c.

In a word: such is their natural temper and disposition, that rather than be idle and inactive, they will be doing mischief, *viz.* plundering and robbing their neighbours. To conclude; if ants are commended for their prudent pains, providing their meat in Summer, and gathering their food in harvest, though unserviceable to men; how much more worthy of praise are these instructive, exemplary insects, who herein set us (both as men and Christians) a pattern fit for our imitation? *Go then to the ant,* (or rather to the Bee,) *thou sluggard, and learn wisdom.*

My drowsy pow'rs, why sleep ye so?

Awake my sluggish soul!

Nothing has half thy work to do,

Yet nothing's half so dull.

The little Ants for one poor grain

Labour, and tug, and strive;

Yet

*Yet we, who have an heav'n t' obtain,
How negligent we live !*

*Good God ! on what a slender thread
Hang everlasting things !
Th' eternal state of all the dead,
Upon life's feeble strings.*

*Infinite joy, or endless woe,
Attends on every breath ;
And yet how unconcern'd we go,
Upon the brink of death * !*

The Ant has no guide to direct her what to do, no overseer to observe whether it is done or no, nor ruler to punish her negligence and misconduct ; yet acts as if it were so. How doth this aggravate our sloth and improvidence, who have a guide to shew us what is good, an inspector of all our actions, and a Lord and Ruler to whom we are accountable ! Shall we then be idle and inactive, and suffer ourselves to be outdone by such creatures as these ? Would not that be both our sin and shame ?

*In morning fair these lab'ers cut the sky,
Thro' all the gardens and the meadows fly ;
And free from envy, by their labours strive,
Which shall contribute most t' enrich the hive.*

Such

* Dr. Watts's Hymns, Lib. 2. H. 25. 55.

*Such is th' employment of their happy days;
And such their title to immortal praise.*

Dimsdale on Bees.

Their Innocency.

THEY are also naturally innocent, inoffensive, and patient. In their foreign labours, gathering honey, or other materials distant from their hives, they are not easily provoked, but will bear personal injuries and affronts with wonderful patience. In their honest and lawful employments you may disturb them, drive them from place to place, and from flower to flower, without any resentment, and escaping by flight, they follow their work elsewhere, in some peaceable quarter; but he that affronts them in their own dominions, and in their busy times of gathering, will soon be sensible of their resentment, that they are implacable and unmerciful; and if he be a sufferer; he may blame himself for his imprudence and presumption.

In their own kingdom, and among themselves, they are strictly just; not the least injury or wrong done by any one member to another: but they are not so to strangers and foreigners; to these they are most notoriously and inexcusably unjust, robbing and plundering from others wherever they have power, and whenever they find an opportunity.

Their

Their Sobriety.

THOUGH they live in the greatest plenty of the most delicious food, it cannot tempt them to the least excess. What they have so painfully collected, and most carefully treasured up, is sparingly and prudently used, and with the greatest moderation and frugality.

They do not prodigally waste their precious substance in riot, revelling, drunkenness, and such like sensualities, as the fool in the Gospel, saying, *Soul, take thine ease, eat, drink, and be merry.* Language more becoming a brute than a man.

But though they have at all times free access to this fulness, they never take more than a moderate repast. Eminent self-denial! Never was one among them all seen disguised or disordered through their most beloved liquid.

Their Chastity.

THE next endearing excellency wherein they are examples to all, is their strict and inviolable chastity. As they spend not their riches in riot and drunkenness, so neither in lust and wantonness, or carnal concupiscence. As to the manner of propagating their species, whatever passes among them of that nature, it is entirely hid from the eyes of all men, and the most strict, diligent, and curious observers and inquisitors have not been able to discover it. It is a secret, and will remain a mystery. Dr.

Butler

Butler says they do not copulate as other living creatures do *.

Come hither all you drunkards and debauchees, and from these learn to be chaste and sober. No more dishonour your bodies; no longer degrade those noble natures God has given you. Meaner souls than yours would serve well enough for those base offices you commonly employ them in; to eat, drink, and play. Are you capable of conversing with angels, and the God of angels, and of enjoying him? place your souls no more with dogs of the flock.

Their Neatness.

ANOTHER virtue that should not be past over in silence, being a pattern to all, especially the female sex, ladies, gentlewomen, and others; particularly those whose province it is to discharge the offices of the kitchen, &c. is their cleanness and decency. They naturally abhor all that is filthy and impure, empty themselves in flight, cleansing their hives of all that is defiling and offensive, carry forth their dead, and suffer nothing to remain that is in their power to remove, and in the least disagreeable †.

They also live upon the finest food, the purest honey; as they extract it from the flowers, they deposite it in their cells appointed for that purpose, without any debasing mixtures or adulterations.

And

* *Apes femine non coitu concipiunt.*
animalium.

† *Mundissimum est omnium bos*

And in their dress and personal appearance they are neat to a proverb. I write not this to countenance pride in any, but rather to recommend and encourage decent, modest apparel in all.

When the tenants of the place, or rather the natives and rightful possessors, are disinherited, either destroyed without mercy, or incorporated into another family, and you invert the hive, to view the noble fabric, and rich furniture, what an entertaining prospect is there before you! nothing disorderly or indecent to be seen; nothing but the greatest regularity, purity, curiosity, elegance and beauty through the whole, most delightful to behold!

Sympathy, and mutual Assistance.

WE may moreover observe their sympathy and mutual assistance. They most readily and cheerfully embrace every opportunity of helping, and being serviceable to their fellow-subjects; as in invasions from enemies, in killing the drones, burying their dead, and carrying away all that is prejudicial and provoking. When the labour or burthen is too much for a single Bee, how oft may you behold a second and a third joining their forces, one at one end, another at the other end, dragging the disagreeable object out of their dominions.

Their

Their Sagacity.

THEIR sagacity and prudence are observable. (Prudence metaphorically understood.) They act by natural instinct, as though they were rational; not only providing in Summer their Winter stores, but also places of refuge and defence, to which they may retreat when night or storms come; as rocks, hollow trees, &c. if their owners prevent them not by hives, as proper habitations.

He that gave them their being has empowered them to act with as much sagacity, foresight and consistency, for their own welfare and security, as though they were rational creatures.

Their Vigilance and Watchfulness.

THOUGH they are such excellent, exemplary, instructive, and profitable creatures, yet have they many enemies; therefore they are most watchful, keep a constant guard to prevent a surprize, examine all passengers, and are presently in arms, on the first motion, disturbance, or alarm, their All being in danger. In their hives they are not always safe; therefore constantly upon their guard.

Are all these virtues thus visible in these insects that want reason; how much more should they appear in men, and in Christians? Do they hate treason and rebellion,

bellion, faction and division, cowardice, idleness, injustice, intemperance, impurity, indecency, selfishness, improvidence, and security, why should we practise them?

Let us learn the contrary virtues from these instructive insects. But how many of the human species need to be sent to school to Ants and Bees, which better answer the end of their being!

Their Love and Unity.

SINCE infinite wisdom sends us to Ants and Bees for instruction, let us not disdain, nor refuse to learn from these insects, as follows, *viz.*

Love, with loyalty and submission to our only rightful Sovereign KING *GEORGE*, and all lawful power. The Grand Seignior, with all his janissaries about him, is not half so absolute as the Queen of Bees; yet such is their innate loyalty, that they will, with the greatest courage, fight to preserve her in safety.

Again; Courage and resolution in defence of our civil liberties and reformed religion. Will these little insects, without reason, so freely venture their lives and estates in defence of their Sovereign? Let us then behave like genuine *Britons*, and Christian heroes, in the cause of *English* liberty, truth, and true religion.

Also diligence and prudence; seasonably providing against a spending time. Bees neither beg nor borrow, and spare no pains in Summer to lay in their Winter-store.

store. Herein they are patterns to us; let us follow their example.

As also in purity. They cannot dispense with any thing filthy or unclean, but cast forth whatever is defiling and offensive. Let us learn to abhor and shun all that is polluting and impure. Heterogeneous will not incorporate; light and darkness are inconsistent. How can purity and pollution dwell together?

Unity likewise, with love and peace. No divisions, contentions, or wars among themselves, which shame us, considered either as fellow-subjects, or fellow-christians.

Temperance and sobriety in the enjoyment and use of our outward comforts. They are laborious to lay in plentiful provisions, not for sensuality and excess, but only for necessary support, the preservation of health and life.

Again; patience and innocence. They are never injurious to any, except they are provoked; and at a distance from their hives, they will bear many indignities and affronts, without the least resentment.

May we study to be blameless where we may not be exemplary; bless those who curse us, and pray for those who hate and persecute us.

Moreover sympathy and mutual assistance. They help one another most readily, both in their wars, and constant labours, which should teach us brotherly kindness and charity.

Finally, constant watchfulness. These insects have many enemies ; for which reason they never give themselves up to security, but have their guards to watch the city, and prevent a surprize.

How many are the Christian's enemies ? King *David* compared his to Bees.* How great is the number of infernal spirits ? that are very powerful, politick, malicious, cruel, diligent, and ever watchful. Let these also teach the Christian soldier, constant watchfulness.†

Hannibal at the gates was enough to awaken the citizens of *Rome*, and call them to their arms.

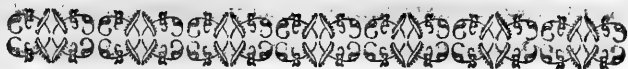
The grand enemy (Satan at hand) should call the christian to his prayers, and keep him ever on his guard. Let us take *Solomon's* advice. ‡

* Pſal. cxviii. 12.

† *Fas eſt et ab Hoſte doceri.*

‡ Prov. vi. 6, 7, 8.





C H A P. II.

Their OEconomy, or Form of Government.



S the wisdom of Providence, which demands our utmost attention and regard, is most obvious and visible in innumerable other instances ; so likewise in these little, yet most admirable insects. They are a perfect monarchy, agreeable to the original plan : they cannot thrive, nor live, but in society, and under a Sovereign. And what would be the fate of this universal empire, were it not for an infinitely wise and powerful superintendency ?

The ants may be considered as a democracy, or common-wealth, having no overseer, or ruler ; but in these insects God hath shewed to men the express pattern of a perfect monarchy ; the most natural and absolute form of government.*

Without a president, or ruler, they will do no manner of work : neither gather wax, nor honey, nor other materials ; nor can they breed, and propagate their own kind, without such a commander. If a stock, they would yield to robbers ; or else languish and pine themselves to death, and the whole society most certainly perish.

C 2

This

Dr. Butler's Fœm, Monar.

This proclaims the value of this royal insect, far superior to all the populace. Had you ten thousand, or ten times ten thousand of these common subjects, without a Sovereign, they would be but as so many cyphers without a figure, of no significancy, worth, or service.

Do but therefore supply a languishing stock as above, with a president or principal ; do but provide them with a common parent, and it will prove as life to them from the dead ; inspire every breast with fresh courage and vigour. No sooner is the news proclaimed in publick, but with surprize and pleasure will you see the happy change ; inexpressible joy reigning thro' the whole empire ; all hands are immediately employed, and their future, chearful, faithful, and constant labours, will abundantly recompense your tender and compassionate regard, your generous assistance and relief, in their most sorrowful and distressing circumstances. And by this one kind act and office, you prevent the total destruction of many thousands of these excellent creatures ; nay, of an entire kingdom or empire. Delightful thought !

Here it must be observed, that this Regent ascends not the throne as an usurper ; gains not the regal power and authority by conquest or force of arms ; nor by acts of tyranny, injustice, oppression and cruelty ; nor again by election, (as some suppose) but by hereditary right ; nature having entitled and advanced her to this sovereign dominion, and imperial dignity. So that her claim is indisputable and unalienable. *Butler* observes, that the

Queen

Queen comes to the supremacy by fucceffion, or a judicious, prudent election; alfo by birth-right and feniority. If that right be hereditary, why fhould it not be conftant and immutable?

As they cannot fubfift, much lefs prosper, without a guide or ruler, fo neither will they admit of feveral. A prefident or governour appears abfolutely neceffary; and no more than one will be tolerated among them. A plurality of rulers would introduce that confufion which would occafion the certain and entire deftruction of the whole ftate, unlefs thofe competitors and pretenders to the crown be prefently depofed.

In all fwarms united, wherein are more or fewer of the royal iffue, all excepting one are flain and expelled. And in thofe wars and contefts, where the forces are near an equality, how fatal have I often found the confequence. Such fixed battles I have fometimes beheld, and that not for a few hours, but two or three days together; till one fide has been entirely vanquifhed and fubdued, or both disabled; and in fhort ruined, and brought to defolation. But, united under one Sovereign, they live in perfect peace. Whence it is plain beyond difpute, this is their form of government, and this alone. A body without a head would be a monfter, and two heads to one body would be the fame:

Here I muft insert a paffage, which at firft fight feems to militate againft the received opinion, and all the obfervations I have made of their form of government, as follows.

Towards the end of *March* 1743. walking at even-tide in my chief apiary, I observed at some distance from the mouth of one hive, (all the other stocks being within doors, and in perfect peace,) a small cluster of Bees in some commotion, which raised my curiosity to see what might be the occasion, justly concluded it to be something uncommon; going directly to the hive, immediately I discovered, among the croud, a royal corpse carrying forth to burial. The number of the mourners attending the funeral did not amount to twenty; I took the dead body from among them, after which, in a little space, they returned to the rest of their company.

This being a circumstance I had never met with before, I was in doubt for some time about the event. If we conclude aright as to their form of government, *viz.* a perfect monarchy, I apprehend this stock, having thus lost their Sovereign, must of necessity miscarry. On the other hand, observing no disorder or confusion among them, as is usual on the loss of the Governour, I was in hopes they might be safe; this hope daily increased, as by a strict and frequent observation I found they continued quiet and in peace.

In about a week the weather proving more favourable, and inviting them to their most delightful labours, these with the other stocks, began again to work, to collect necessary materials, &c. by which I saw they were indeed safe, and my former fears altogether without foundation.

Here then a question may arise, whether or no there were two Governours all the preceeding winter in the
said

said hive ; or this Bee, thus discarded or destroyed, of a late extraction.

The former, so directly contrary to the general opinion, observation, and constant daily experience, is not to be admitted ; and supposing, yet not granting, it as matter of fact, I query, why this supernumerary should be suffered so many months, even all the winter season, and expelled only in spring.

It seems most reasonable therefore, upon the whole, to conclude this Bee was born out of due time, produced too early for the swarms, and for that reason thus deposed. Upon which hypothesis our fundamental principle remains firm and unshaken. But should the contrary appear, it would be but a single exception from a general rule. Should any fuller evidence appear needful in what is now under our consideration, I will only add as follows, and with an air of certainty and assurance also, as final and conclusive, that in all the stocks I have for the space of thirty years united, (particularly near fifty the last *October*) I never, on the strictest search, found more than one Commander ; which I think amounts to demonstration.

These insects then, without controversy, are governed by a single Sovereign, as absolute as the grand seignior himself.

*Nor do the female troops of Thrace obey
With humber care, their Queen's despotick sway;
Than the submissive Bees the royal mind
Most absolute, yet always just and kind.*

*Distinctive honours in the regent shine,
To shew the virtues of the scepter'd line;
Superior goodness finds a just reward,
And publick love is a perpetual guard.*

*But if by death to the elysian shade,
The much lamented royal guest's conveyed;
In stately pomp the honour'd body lies,
And all the city's fill'd with mournful cries.*

Dinfdale on Bees.





C H A P. III.

The Description, or Anatomy of the Bee.

AM now entring upon a service, to which I am unequal, and much unqualified for. So many and so great are the difficulties that attend enquiries of this kind, that a much abler hand, and more ingenious mind, is necessary to remove them, and place what comes here under consideration in a clearer and fuller view.

After all our late improvements in natural philosophy, there yet remains those secrets in nature, that the most diligent, accurate search, and painful disquisition, will not be sufficient fully to discover.

In naturals, as well as spirituals, we shall know only in part. And after we have gone the utmost lengths possible, in such enquiries, there will be some imperfection in our knowledge, during the present depression of our nature.

Many useful observations have been made in these latter times, by the improvement of the microscope; whereby a very great difference between things natural and artificial hath been made manifest.

There are such and so great embellishments and curious inimitable embroideries in the smallest seeds of plants
and

and flowers, but especially in the several parts of animals, such accurate elegant order, admirable beauty and symmetry in the frame and composition of the minutest creatures, as no man could conceive or credit without beholding them.

“ More particularly those in human bodies. The
“ consideration of which induced *Galen* to acknowledge
“ a Deity.

“ In his book *de formatione foetus*, he observes more
“ than 600 several muscles in a human body, and at
“ least ten different intentions or due qualifications to be
“ observed in each of these. Proper figure, just mag-
“ nitude, right disposition of it's several ends, upper and
“ lower position of the whole, the insertion of it's pro-
“ per nerves, veins, and arteries, all which are to be
“ duly placed ; so that about the muscles alone, no less
“ than 6000 several ends or aims are to be attended to.
“ The bones he reckons to be 284. The distinct scopes
“ or intentions in each of these, are above 40. in all
“ about 100,000. And it is the same in proportion
“ with the other parts, *viz.* the skin, ligaments, vessels,
“ glandules, and humours ; but more especially with the
“ several members of the body, which do, in regard of
“ the great variety and multitude of the several intenti-
“ ons that are required in them, very much exceed the
“ homogeneous parts. And the failing in any one of these
“ would cause an irregularity in the body, which in ma-
“ ny of them would be very notorious.

“ And thus likewise it is in proportion with other
“ kinds of beings, minerals, vegetables ; but more es-
“ pecially

“pecially the sensitive; as fishes, insects, birds and
“beasts.

Were we able, even by the help of glasses, to take the fullest and most strict survey of this little animal, so full of wonders, could we by any means enter into it's inmost recesses, view it's almost imperceptible parts, most commodiously adapted to their several offices, their excellent contrivance, admirable contexture, their elegance and beauty, the minute particles of which they are composed; together with all their secret springs of most regular, artful, beneficial motion, and the various uses, ends and purposes they are appointed to subserve, it would appear the most exquisite piece of workmanship.

But as I pretend not to entertain the reader with an exact analysis, or compleat anatomy of the body of this insect, I shall quit that province to some superior genius, who more able to penetrate into these hidden and profound mysteries, may place them in a clearer and fuller light.

The great and bountiful Creator of the world has not been wanting to any, even the meanest of his creatures, having furnished them all with excellent capacities, and qualified them suitable to the stations he hath appointed for them; and wonderfully fitted them for all those offices he intends to employ them in.

As a perfect insight into the mechanism of these most admirable insects is not absolutely necessary to the due management, or a right and profitable improvement of them, it may be sufficient to take notice only of their
various

various instruments, organs, and utensils, so well adapted to their respective offices and employments, necessary for their maintenance and defence; or their principal parts, which are very obvious to all observers, leaving the more minute and less visible, (discerned only by the help of the microscope) to the more curious and skilful anatomists, to place in a better light.

Description of the Bee.

A Bee is an insect,* and a flying insect, consisting of three principal parts, viz. the head, the breast, and the belly; the first is the least, and the last is the largest of the three.

In the head (which is of a triangular form) we are to consider the external parts; the eyes, the mouth, or jaws, the tongue or trunk, and the horns.

First, the eyes, which are of an oblong figure, black like jet, transparent and immoveable, covered and defended from all injuries, by an horny tunicle, not easily penetrated; therefore an effectual security to their sight, which some writers tell us is their weakest sense, tho' sometimes I have found it quick enough to my sorrow. The eyes serve as two cheeks, and supply their place on each side.

The second is the mouth, or jaws, opening like the mouths of some fishes, to the right and left, serving, instead of hands, to carry out of the hives whatever offends, incumbers, or incommodes them.

Here

* *Ab infecare.*

Here are their teeth, by which, in their wars and battles among themselves, they kill one another, and not with their stings, as some assert, and others suppose. In the space of forty years, I never saw one of these insects fix it's sting in another, excepting once.

Their chief strength lies in their teeth, which are terrible instruments of revenge, and most fatal ; for all that are thus bitten most surely die in a short space : you may frequently observe them with their wings disabled, or their joints dislocated, which they cannot long survive ; for their wounds are always mortal.

The third is their trunk or tongue, which by reason of its length, the mouth is incapable of containing ; but is doubled under the throat down to the breast, divided into five branches, the outermost being as a case to the rest.

It is pliant and flexible to the last degree, as well as taper ; and of such length, that the Bee may be the better enabled to probe and penetrate to the bottom of the flowers, and exhaust all the dispersed mellifluous juice for the publick service.

From the spongy nature of this proboscis, or polyglot, springs that power of suction, whereby they are enabled quickly to absorb all those delicious sweets the flowers, &c. so plentifully afford them ; which, as they are extracted from trees, plants, or flowers, are directly conveyed into the little bag or bladder, in the third and last division, by means of two aqueducts, or little canals, which serve also as two ligaments, to join the principal parts together ; afterwards the honey is conveyed back
again

again thro' the same passages, and placed in the cells, or proper magazines, by the same instrument that collected it.

The parts that offer themselves next to view, are the autenns, or pair of horns, with two joints; the one close to the head, the other near the middle, pliant and bending every way; or else composed (as they seem) of lesser joints, not to be seen by the naked and unassisted eye. These are the principal instruments of feeling, especially in the dark hive; and are placed betwixt the eyes, near the middle of the head, whose largest dimension is it's latitude, as will soon appear upon it's separation from the adjoining part, and yet is the seat of all these necessary and useful members, besides the brain, best discovered by the microscope.

The breast, or second division, is in form a spheroid, or cylinder, of larger extent than the former, but shorter than the latter, and in which are placed their wings and legs; one above, and the other beneath. Their wings are pellucid and shining, fixed two on the right, and two on the left; of a curious compofure, not unlike cypress, and much resembling the combs when first formed; yet strengthened with many ribs, or fibres, running thro' the whole. By the help of these they transport themselves at pleasure from place to place with such velocity, that in a few minutes they are a mile or more distant from their hives.

These by constant labour are quickly wore out; and, when they appear rent and torn, are sure signs of their approaching death. These parts prepared for flight, are so firmly fastened, by a strong and knotty joint, that they
are

are not easily separated from the body ; and of such an extent, as to cover the greatest part of the last division.

Underneath the breast are the legs, six in number, three on the right, and three on the left, but in length unequal ; the first pair next the head are the shortest, the middle pair somewhat longer than these, but shorter than the third and last.

They are all pliant, having many joints ; the first serve equally for hands and feet, and so scabrous, rough and jagged, that they generally fix upon a leaf or flower at the first touch. And at the extremities of the paws, by the help of the microscope, appear little hooks, whereby they fasten themselves together, and cleave so close to one another in their hives, and in swarms, that they are not without some difficulty separated. “ Their
“ legs and feet, wonderful in their structure and contri-
“ vance, according to their different circumstances and
“ necessities of life, afford a most delightful variety of
“ objects ; particularly the sharp-hooked claws, which
“ enable them to walk on grass, and other smooth sur-
“ faces ; also a sort of sponges, which preserve their
“ claws striking against hard bodies, by the soft fleshy
“ protuberances at the bottoms of their feet.”

The inside of the breast, consisting of a porous, fibrous, reddish flesh, contains the heart and organs of respiration ; best discovered by the help of glasses. A small contusion of this part, (including the vitals) occasions death.

The third and last part is the belly ; in which we observe six rings, sliding one over another, resembling the
scales

scales of fishes, which have a power to extend or contract themselves as there is occasion, by the help of proper muscles nature has accommodated them with (tho' Mr. *Rusden* could discover only three partitions, with silver coloured lines across, p. 5. which at once shews how incurious he was in his remarks, and how remote from the truth in his report.) And within these plaits they fix and carry their wax; and not upon their legs or thighs, as the common people generally conclude, and most authors I have met with have ignorantly, yet very confidently, asserted.

But of that more hereafter. This is the largest oblong, and in some degree annular, taper, and piramidal. Within this last division, or integral part, we find the bladder, or little bag, in which they carry both water and honey, conveyed thither at the time of gathering, thro' the narrow channels, which traverse the head and breast, and reconveyed to answer the several purposes for which they are so carefully and painfully provided. The bag of poison hath it's place here, near the root of the sting.

Here likewise is the gut, which is only one single entrail; and when left with the sting, is certain death to the insect. The extremity of this last part is the place of evacuation.

The last part to be examined, and the most curious of all, is the spear, which certainly hath a polish exceedingly fine, and is without dispute a most exquisite piece, and the point imperceptible.

This

This penetrating instrument is distinguished, and commonly known by the name of the sting, by which these insects defend themselves against men and beasts, and offend their enemies.

It is of an horny consistence, and hollow like a tube, near the extremity of which is an orifice, thro' which the insect emits two darts, strong and pungent, tho' inexpressibly fine.

But to give the reader a fuller description of so curious an instrument, I readily accept the assistance of those gentlemen who have, by the help of the microscope, most strictly examined it.

“ It thus appears to consist of three parts, *viz.* a
“ sheath or scabbard, with two bearded darts, of an un-
“ equal length, which rising obliquely, make the wound
“ the more painful, prevent the return, and render the
“ extraction the more difficult and troublesome. The
“ sheath terminates in a sharp point, and near the ex-
“ tremity a passage opens, thro' which, at the time of
“ stinging, the two bearded darts are protruded beyond
“ the end of the sheath; one of which being longer than
“ the other, fixes it's beard first, and the other instant-
“ ly following, they alternately strike deeper and deeper
“ into the wound, by their hooks taking faster hold of
“ the flesh when a poisonous juice is injected thro' the
“ same (spicula) or sheath, from a little bag at the root
“ of the sting, which for a time occasions an acute pain-
“ ful swelling.”

Mr. *Derham** tells us, that in the sting of a wasp he counted no less than eight beards on the side of each

* *Derham's Phy. Theo.* p. 241.

dart, and Mr. *Baker* † has observed the same number in that of a Bee.

The muscles of the sheath are strong, by which it easily enters the flesh of man or beast.

From the whole it is plain, that what appears darting forth from the body of the Bee, is not properly the sting, but only the sheath wherein it is inclosed. And it is easy to tell when the insect shoots forth this instrument, (tho' neither seen nor felt) merely by the smell, which is not in the least disagreeable.

Frequently I have observed, when the insect hath shot forth this part, with an intention of revenge, or in it's own necessary defence, at, or near it's extremity, a little drop of that poison, which upon the first puncture insinuates itself into the wound. Whence it is not unreasonable to conclude, this alone, piercing or penetrating the skin and flesh, is sufficient to inject the said poison, without the assistance of the two darts; yet these may be instrumental in fixing it faster in the flesh; as I have oft beheld it, when tore off from the body of the Bee, working itself still deeper into the wound.

Thus have we (tho' very imperfectly) viewed their principal parts; the several organs, or implements, nature has furnished them withal, for their subsistence and defence.

No less indulgent has nature been to them in regard to their dress; their very raiment, resembling the finest velvet, bright and glittering; their whole bodies covered with the most curious hair, not unlike to the richest shagg, which greatly embellishes every part, more es-

† *Baker's Micr.* p. 210.

pecially the breast, and far excels what the greatest master in that art can pretend to.

How infinitely then do the secret beauties of nature transcend and surpass those of art; which curiously examined, charm every ingenious mind, filling it with an inexpressible delight and pleasure!

What is all the pageantry, splendour and glory of an earthly court, to nature's simple dress and secret beauties, far more moving and entertaining!

If King *Solomon* in all his glory was not arrayed like a single blade of grass, or a flower; how much less like one of these curious insects!

Examine the finest and most exquisite performances of human art, and compare them with the productions of nature, and how exceeding great will the difference appear! and by how many degrees hath nature the pre-eminence!

“The sting of a Bee, viewed thro’ a microscope,
“shows every where a polish most amazingly beautiful,
“without the least flaw, blemish, or inequality, ending
“in a point too fine to be discerned; yet this is only the
“case, or sheath, of two other instruments much more
“exquisite, contained therein.

“*Dr. Power* tells us, he saw a golden chain at *Tre-*
“*descant’s*, of 300 links, not more than an inch in
“length, fastened to and pulled away by a flea.

“And *Mr. Baker* says,* he saw near *Durham-yard*
“in the *Strand*, (which he examined with his microsc-
“cope) a chaise, made by *Mr. Baverick* a Watch-maker,

D 2 “with

* *Baker’s Microsc. pag. 295.*

“ with four wheels, and all the proper *Apparatus* belong-
 “ ing to them, turning easily on their axles; together
 “ with a man sitting in the chaise; all formed of ivory,
 “ and drawn along by a flea, without any seeming diffi-
 “ culty: And weighing it with the greatest care, found the
 “ chaise, man and flea, were barely equal to a single grain.

“ At the same time and place, he also weighed a
 “ chain of brads made by the same hand, about two in-
 “ ches long, containing 200 links, with an hook at one
 “ end, and a padlock and key at the other, and found it
 “ less than the third part of a grain.

“ And since that, (made by the same Artift) he saw a
 “ quadrille-table, with a drawer in it, an eating-table,
 “ side-board-table, a looking-glass, twelve chairs, with
 “ skeleton backs, two dozen of plates, six dishes, a dozen
 “ of knives, and as many forks, twelve spoons, two
 “ salts, a frame and castors, together with a gentleman,
 “ lady, and footman, all contained in a cherry-stone;
 “ and not filling much more than half of it.

“ He likewise mentions one *Oswald Nerlinger*, who
 “ made a cup of a pepper-corn, which held twelve hun-
 “ dred other little cups, all turned in ivory, each of them
 “ being gilt on the edges, and standing upon a foot, and
 “ that so far from being crowded, or wanting room, the
 “ pepper-corn could have held four hundred more.

“ And then adds, these are some of the nicest, most
 “ curious and surprizing works of art, but let us examine
 “ any of them with a good microscope, and we shall be
 “ immediately convinced, that the utmost power of art
 “ is only a concealment of deformity, and imposition
 “ upon

“ upon our want of sight; and that our admiration
“ thereof arises from our ignorance of what it really is.

“ Thus (as he concludes) sink the works of art, when
“ we are enabled to see what they really are. On the
“ contrary, the nearer we examine, the plainer we distinguish, and the more we can discover of the works
“ of nature, even in the least and meanest of her productions, the more sensible we must be made, of the
“ wisdom, power and greatness of their author.

“ Apply the microscope where we will, nothing is
“ found but beauty and perfection. View the numberless species of insects around us; what proportion, exactness, uniformity and symmetry shall we perceive in
“ all their organs! What a profusion of colouring! Azure,
“ green and vermillion; gold, silver, pearls, rubies and
“ diamonds: fringe and embroidery on their bodies,
“ wings, heads, and every other part! how rich the glow!
“ how high the finishing! and how inimitable the polish we every where behold!

“ It is the same in larger or lesser animals; how amazingly curious must the internal structure of these
“ creatures be! the heart, stomach, entrails and brain!
“ how minute and fine the bones, joints, muscles and
“ tendons! how exquisitely delicate, beyond all conception, the arteries, veins, and nerves! what multitudes
“ of vessels and circulations must be contained within the
“ narrow compass! and yet all have sufficient room to
“ perform their different offices and operations, without
“ impeding or interfering with one another.

“ Thus we behold the most perfect works of art, be-
D 3 “traying

“traying a meanness, poverty and impotency in the a-
 “gent ; but those of nature plainly proving that the
 “hand that formed them, was absolute master of the
 “materials it wrought upon, having tools exactly suit-
 “able to it’s whole design. Every hair, feather or scale,
 “even of the meanest insect, appears polished and fi-
 “nished to the highest pitch ; and shews the abundant
 “riches, munificence, and skill of it’s maker.

The works of nature then as far surpass the most perfect works of art, as infinite wisdom and power surpass what are merely finite. In all human operations, we see little but inequalities and deformities. The bounds of their abilities appearing therein ; every part demonstrating the Author’s imperfection ; but the works of the Creator are every way perfect.

The performance of the most perfect artist, set in competition with those of the great Architect, are poor, mean, inelegant, incomplete, bungling in every part ; and in the whole disproportionate, irregular and deformed.

The foregoing remarks, I have inserted from Mr. *Baker’s* great improvement of the microscope, in discovering the secret beauties of nature (so highly acceptable to the learned world) chiefly for the sake of those readers, who may want an opportunity to peruse the original.

As to the several senses, Bees seem to have them in very great perfection.

They are quick of sight ; tho’ some apprehend a defect therein, observing them coming out of the hive, to wipe their eyes with their fore-legs before their flight.

Their

Their smelling is excellent; and by this sense they presently, in the dark hive, find out strangers and robbers, as well as drones.

Their hearing and feeling are the same. The lightest touch of the hive, &c. they presently perceive, witness the noise within, and their appearance at the door.

They as quickly distinguish tastes, wherein they are exceeding curious. And their internal senses, or qualities, are far more excellent, as observed before.

What creatures do we find more full of wonders, or expressing greater excellencies? not to be met with in beings of much larger bulk.

How curious their form and composition? such a variety of parts, number of joints, and their connections, so regularly and most admirably disposed, in so small a fabrick? “ All which, besides what lyes out of sight, do
“ abundantly demonstrate, and evidently prove the infinite wisdom and power of the great Creator; which
“ we ought to acknowledge and admire in the meanest insect, and most contemptible animal; in an ant, as
“ much as in an elephant.

“ These insects may justly plead equality with the
“ greatest beings upon earth, and boast with the best
“ among them, the proudest monarch and most glorious
“ below, saying, (*Est Deus in nobis*) here behold the power of God, the presence of Deity!

“ And it may be queried whether the Divine Providence, in its most sublime and mysterious operations,
“ calls more for our wonders, than in the contrivance,
“ policy, &c. imparted to these little creatures, or little
“ societies of Bees.



C H A P. IV.

Their Sorts, Sex, and Manner of Breeding.

THOUGH (without controverfy) all the Bees in a swarm, hive or colony, are of the same species or kind ; yet, in their external form and composition, in the several posts or provinces they occupy and act in, the offices they separately discharge, together with the ends and uses they are appointed to serve, there is a very great and manifest diversity among them ; for which reason we place them in three distinct classes, viz. the Sovereign or Regent, the common honey Bees, or working part of the nation, and the Drones : no other order among them can be admitted.

Dr. Butler tells us,* that besides the Sovereign, the Bees have also subordinate leaders and governours, fitly resembling captains and colonels of soldiers, distinguished by particular marks, as if there were degrees of dignity among them ; but in all other respects like the vulgar.

It appears, Pliny led him into this mistake. † Mr. Rusden after the Doctor has distinguished them into four parts, viz. king, captains, commons and drones ; but in

his

* Butler's Fœm. Monar. pag. 6. † Pliny, L. II. c. 5, 17. Rempublicam habent, Consilia, ac Duces circa Regem Satellites.

his following description takes no further notice of the second rank. †

From forty years diligent observation and experience, I have not learned any such difference, as these two gentlemen have insinuated; nor in reality is there any such distinction among them. Both the physician and apothecary have herein imposed upon their readers.

Tho' the Doctor was no doubt the best, and the most judicious writer, of his time, upon this subject; yet from many other instances, besides what I have mentioned, we find him fallible, and much mistaken; asserting many Things as matters of fact, which are only mere conjectures.

Some things moreover he writes, not suited to vulgar minds; as in others he seems too prolix and voluminous. Yet take his monarchy together, and in all its parts, it must be owned an excellent performance, especially in that age of the world.

The Sovereign, or Queen-Bee described.

THIS stately, beautiful, most noble and glorious insect, in so many things expressing royal majesty, has been for a great number of years my grand favourite. A Princess I greatly admire; very highly value and esteem, and as justly prefer before the many thousands of her subjects.

The reasons determining me to give her (in this history) the title of Queen, rather than King, in opposition

not

† *Rusden's Discov.* pag. 2, 3,

not only to the ancient, but also some modern writers, the readers will find, in the section immediately following.

The management of Bees to the greatest advantage, particularly their preservation in hives, at the time of union, depending so much on an ability to discover and separate this Sovereign from such a multitude of subjects, it is necessary that I decypher and paint her in such plain characters, or discriminating peculiarities, that every Bee-master may the better know her, and more readily distinguish her from all the rest, and take her from among the croud into close custody.

Thus the poor Queen becomes a prisoner, and is deprived of all her people and her liberty together. But till the owner is enabled by the following marks and characteristicks, or his own observation, thus to distinguish her from the populace, I would not advise him to attempt an incorporation, which would be attended with some ill consequences.

The Sovereign may be known from all her subjects by the following criterions, or marks of distinction, *viz.* by her bulk and stature; by her shape or figure; or by her colour and complexion.

1. By her bulk and magnitude; being much larger than the commons, and longer than the drones, and her several parts in just proportion; though some authors say her wings are shorter, and others, that they are of the same size with the commons; they do indeed appear short, which is owing to the extent of the last division, yet, upon the most accurate and strict examination, it appears that those authors were mistaken, her wings exceeding

ceeding in length those of the commons; and she flies with as much celerity, strength and vigour, as they do. It is the same as to her spear or sting.

Mr. *Purchas* tells us her sting is little, not half the length of a common Bee.* Mr. *Rusden* affirms it is not so large, nor so long as the sting of a common Bee; † after *Pliny's Pennæ breviores*. But both those gentlemen were mistaken; her sting in reality being longer than others.

Others are of opinion she has no sting at all,‡ because they never saw it. And for the same reason there are men in the world, who say there is neither God nor devil, angels or spirits.

It is very true that this sword is wore by the Sovereign, rather for state, than service, having seldom observed the royal insect to put it forth, tho' highly provoked thereto. In *October* 1743, I made the experiment upon several, and found every one of them determined rather to loose her dearest life, than use the sword in her own defence, so contrary to the principle of self-preservation implanted in nature.

Her tongue is shorter than that of the Honey-Bees; nature having design'd them only for foreign labours, but not the Queen, who is to live, as do other sovereign princes, that are maintained and protected by their subjects.

Mr.

* *Pur.* pag. 28.

† *Rusd.* pag. 4.

‡ *Apum Regina simulo caret.* The Bees yield obedience to her unarmed Sovereignty. Memorable to this Purpose was the Practice of a certain King of France, who entering a conquered City, expressed his Clemency by this Symbol, viz. a Coat full of Images and Pictures of Bees, with this Motto upon it, *Rex Mucronis caret.* The King does not wear, neither does he use his Sting. *Purchas.*

Mr. *Rusden* also affirms, that several of these princes have at first a spot upon their foreheads, not unlike a diadem; which he very probably took, as well as other things, from *Pliny*.^{*} But of all the numbers I have viewed and examined, for the space of so many years (including 30 or 40 the last season) I could never observe any such star. Mr. *Purchas* says the same, and is positive there is no such spot. And yet (pag. 31.) tells us, he hath seen Bees with crests, or tassels upon their heads of different colours; which must be nothing more than adventitious or accidental.

Again, the Sovereign may be easily distinguished from all her subjects by her form and shape; being larger and longer than the labouring Bees, especially in her hinder part, which is by far more taper than all the other, terminating in a much sharper point; nature having given her this peculiar form, in order the more readily to reach the bottom of the cells, where the eggs are deposited for the propagation of the species.

Finally, by her colour also she may be discovered, and by this I have more frequently found her, than by any other marks of distinction. Her upper parts are little, if at all, different from the Honey-Bees, but her belly and legs are of a very deep yellow, much resembling the purest and the richest gold.

When the Bees of a single stock are dropped into an empty hive (as hereafter directed) to be united with those of another stock, the Queen generally falls one of the last,

^{*} *Plin. L. II. c. 16. In fronte macula quodam Diademate Aculeo præditus stimulo armatus.*—Candicans.

last, with her belly upwards, which presently presents her to the eye of a diligent and curious observer.

The populous, which are the laborious and most numerous part of this body politick, are the second sort or class. These with some are accounted the males; but the more prevailing opinion is, that they are females; tho' in truth they are of neither sex. But having already given so particular and full account of this corps, there is no occasion to add any thing further upon this head.

The Drones compose the third and last class, which are about one third larger and longer than the other. The head is round; the eyes full, and form the greatest part of the face; the tongue is short, and the belly differs from the other two, being broader and much more obtuse; of a darker colour than the rest, and thicker cloathed: their voice likewise louder, and in flight making a much greater noise, whereby it is easy to distinguish them from all the rest; and to say when they travel abroad, and when they return, tho' unseen. At their first appearance I have often heard the sound, before I have discerned the insect.

They are also easily conquered, expelled, and slain by the commons, having no sting by which to defend themselves against these imperious dames.*

This is urged by the philosopher as an argument against the agency of the Drones in generation; who says, it agrees not with reason, that the Bees should be females,

* Though the Males generally master the Females, yet here the Females have the Preheminence.

males and the Drones males; because nature never gives females weapons to defend themselves withal; but the Drones are without weapons, having no stings, and are absolutely under the dominion of the females. And that they should procreate by generation is as improbable, no man having ever seen it.

The Drones then are natives, not strangers or foreigners, and bred in the hive, as are the other two; but in cells purposely prepared for them, by the commons, and more spacious than the other cells, in which the Honey-Bees are bred.

“Now, as some suppose, such indolent members
 “would never be suffered in a state so remarkable for
 “conduct and œconomy, if they were not appointed
 “and reserved for some service or other.*” I proceed
 next to enquire, what is their peculiar province or employment.

Of their Sex, &c.

VARIOUS are the opinions of learned authors, as to their sex, and manner of procreation; and they are greatly divided in their sentiments.

It has been a controversy in all past ages of the world, and is disputed in the present age, whether in strictness they are male or female; or consist of both, and propagate their species, as do other insects, by copulation: and if so, which is the male, and which the female.

And so many difficulties occur in enquiries of this nature,

ture, that in all probability, and as far as I am able to judge, the full decision hereof must be left to future time, and the generations which are to follow.

Which is the male, whether the Drone, the Sovereign, or the common Honey-Bee, is the subject of our present enquiry. Some dispute with zeal for the Drones, some for the royal Sovereign, and others for the Commons.

Ancient writers in general, philosophers, historians, poets, and physicians, together with several modern ones, viz. *Butler*, *Purchas*, *Warder*, *Bradley*, and others, plead for the Drones. Dr. *Warder*, in his true *Amazons*, or *Monarchy of Bees*,* affirms the ruler to be a female, as also the common Bees, and that the Drone is the only male.

As to the sex of the last there are many arguments, he says, for what he asserts, as that all creatures breed male and female; and he being the biggest, it is most probable that he is of the male kind: yet in the next period confesses, that it's being in subjection to the other Bees, is an argument against him.

But to put the matter into a clear light, any person opening the belly of the Drone-Bee, he shall find, in the same manner as in birds, a large pair of testicles, as big as great pins-heads, milk-white, joined together upwards by the spermatick vessel.—The penis, or instrument of generation, is indeed much more strange, and will seem incredible to the reader, till he hath tried the experiment.—And in my opinion will appear the same after such experiment. Yet

* *Warder's true Amazons*, pag. 6, 7, 8.

Yet he adds, that the strangeness of it's form and magnitude at first did not a little surprize him, as well it might.

It is in colour of a reddish white, and in shape much resembling the head of a bullock with it's horns.— But to say all that will be useful to the Male-Bees or Drones, they are absolutely necessary to the breeding of Bees; hastening them by their heat, and keeping the eggs warm: therefore it is better to kill six working Bees, than one of these in *May*, or the beginning of *June*. So far the Doctor.

Mr. *Bradley** says, the conformity there is between the inward parts of common Bees and Drones is such, that we have not been able to discern any difference between them; only the parts situated at the extremity of the belly are very different from those of the Bee.

The Bees have a little bladder which contains the poison, discharged by the sting thro' which it passes; but the Drones have neither sting nor bladder; yet have they some other parts, which may lead us to understand the end for which nature hath designed them.

He observes four glandulous cylindrical bodies under the intestines; and inserts a large account of six or seven pages, not much to the profit or edification of many of his readers.

Then adds (pag. 256.) tho' it is difficult for us to know exactly the use of these parts, yet may we say with some probability, that they appear to have been formed for propagation.

And

* *Bradley's Husbandry, &c.*

And as we are confident that the King, who may be easily distinguished from the Drones by his size and colour, is a female, we may say that the Drones are males. Upon which supposition, the cylindrical bodies mentioned before may serve for testicles, *i. e.* two little ones, and two larger for seminal vessels, where the seminal substance is brought to perfection; but I have not been able hitherto to discover in what manner the impregnation is brought about.

He afterwards adds, from some observations made at different times, it hath been conjectured, that Drones contribute nothing at all to the generation of Bees.

How inconsistent is this writer with himself, confidently affirming the Drones to be the males, provided with four testicles (instead of two) for perpetuating the species, and yet contribute nothing to generation?

But a greater blunder than this, (which the attentive reader cannot but observe,) is he guilty of, in saying the King is a female, *q. d.* the king is a Queen, or the male is a female; or that the same individual Bee is of both sexes, male and female. Gross notorious absurdity, and an absolute impossibility! not to be forgiven in a professor of one of our learned and famous universities, and a fellow of the royal society.*

But the professor is not alone, I find others also erring herein; particularly Mr. *Purchas*, who not only inserts the sovereign or governour to be a Queen; but also that she injects a spermatic substance, thick like

E

cream,

*Bradley's *Treatise of Husbandry*. &c. and *Professor of Botany*. Vol. i. p. 151.

cream, into the orbicular cells, where the Queen-Bee is bred perfect at first in all her parts.* What ! doth the very same insect discharge the different offices of King and Queen ! perform the work both of male and female ! and at once lay eggs, and inject sperm ? how can this be ? what occasion would there be for Drones, upon such a supposition, and of what use could they be in the hives ?

How do these gentlemen at once contradict themselves, and confess (in effect) their ignorance herein; not knowing whether the Sovereign is male or female; and should be dignified and distinguished by the title of King according to the ancients, or of Queen according to the moderns.

Dr. *Butler* declares this Bee so necessary, that he cannot be spared, and the Bees without him cannot breed.†

And tho' he is not seen to engender with the Honey-Bees either abroad, as do other insects, or within the hive, yet without doubt he is the male Bee; by whose natural heat, and masculine virtue, the Honey-Bees secretly conceive.

For which he urges the same reason with the authors before-mentioned, *viz.* That upon a curious dissection of the Drone, there appears two large and white testicles, lawful witnesses of his masculine sex.‡

This is contradicted by the philosopher, who says, nature hath not armed the female for fight and force against the male; but the Bees are armed with weapons, and power to chastise the Drones which have no weapons;

* *Purchas's Theatre of Political flying Insects*, &c. p. 29, 34. † *Butler's Fœm. Monar.* chap. iv. p. 55.

‡ *Duos amplos et candidos testes.* *But.* p. 60.

pons; and therefore the Bees cannot be the females, and the Drones the males.*

The Drones are not strangers, or foreigners, but natives, and one of the three estates of the kingdom, (as above) and bred in a comb and cells, more spacious than the rest, prepared on purpose for them. What then is their peculiar province? are they the Queen's royal comforts?† as some conjecture that their principal employment is to furnish the Queen with a numerous progeny, or people the state with subjects.

By the anatomy of the Drone some naturalists have imagined, that they were the authors of generation. Yet that author observes, that on the utmost endeavours to find out, by prying with all attention imaginable what character these Drones maintained in the state; all the observation he could make was this, that the Queen keeps herself retired in the upper chambers of the combs, and seldom makes her publick appearance.

The learned greatly differ in their sentiments about these mysterious insects. Some late writers, as *Butler*, *Purchas*, *Warder*, affirms, the Drones are the males; and the only males; and though they are seen to engender with the Honey-Bees, yet without doubt they are the Male-Bees.

Other authors, especially the ancients, with some of the moderns are as positive, that the governing Bees are the males.

Thus some conclude they preserve and propagate their species by copulation; which others question, and some

* *Generat. Lib. 3. c. 10.*

† *Nat. Delic. Dial. 6. p. 89.*

positively deny: and if we admit that the governing Bee is of the male kind, then it is most evident and certain that they breed without copulation. Since it is that Bee alone which disposes in the several matrixes, or cells, that prolifick substance or matter, which after a few days quickens; appears first a little worm, and at last a perfect Bee.

The Philosopher* says, it is improbable, that some Bees should be males, and some females: but herein he agrees not with the generally received and prevailing opinion, that the numerous species of beings were at first formed male and female; and insects, like all other animals, are first produced by way of generation, and gradually come to maturity, whereby the species is preserved.

“ Therefore every insect owes it's being to a male and
 “ female, proceeds from an egg the product of both sexes,
 “ wherein the seed and first nutriment is enclosed. And
 “ these eggs thus produced are the foundation of a very
 “ numerous offspring.

“ God at first created one man and one woman, from
 “ whom all the race of mankind are descended: he likewise created one lyon and one lyones, from whom
 “ all beasts of that denomination have proceeded; and
 “ it is equally evident, that every insect in the same
 “ manner hath multiplied it's species.†

In so great a diversity of opinions, and a case so dubious and disputable, I will not positively determine either way; but humbly offer my reasons why I cannot fall in

with

* *Aristot.*

† *Nat. Delin.*

with the sentiments of many of these authors ; and leave the diligent and ingenious reader to judge for himself, and adhere to what he apprehends approaches nearest to the truth.

Several writers are publick advocates for the Drones, ascribing to them a principal power and agency in the work of generation ; contending for them as the fathers of the family, the parents of so large a progeny.

There are objections against this opinion ; and some of them of such weight, that I cannot give into their way of thinking.

First, because it appears to me an assertion without proof, a principle which wants sufficient evidence for it's support ; all that these gentlemen have been able hitherto to advance in it's vindication and defence, amounting to no more than probable conjecture, and strong presumption.

Thus have they left us much in the dark, and at the greatest uncertainty, freely and unanimously confessing, that no man ever yet saw any such thing as copulation among them. Which is the argument *Aristotle* urges against this method of procreation.

In the dark hives indeed it must be exceeding difficult, if not impossible, to make any such discoveries ; but it seems somewhat strange and unaccountable (provided this is the way of generation) that for so many successive ages, no person by the most constant, diligent, strict and curious observation, should be able at any time to discern it, especially since the invention of transparent boxes, or glass hives, which give us the favourable opportunity

of viewing them at all seasons, not only when the boxes are full of Bees, but when almost destitute.

But it is nothing new, when we are pinched with an argument, and drove upon the horns, to have recourse to occult qualities, and occult operations; plain professions of our ignorance.

Again; if this principle be admitted, and we allow the Drones to be the authors of so prodigious an increase, why have not these writers, who are counsel for the Drones, and so zelaously plead their cause, dignified and distinguished them with proper titles and appellations? if they are fully persuaded in their own minds, answerable to this their open publick profession, why have they treated them so long thus unkindly and injuriously, withholden those titles of honour from them, to which their character, the posts they occupy, and the noble offices they discharge, do so justly and indisputably entitle them?

Why must the female be crown'd with honour and regal dignities, and all the ensigns of royalty; when at the same time the males are degraded, treated with the utmost contempt, triumphed over, and trampled upon by the populace and commonality; expelled and banished; and, in a word, slain without mercy?

How could an empire or a kingdom possibly subsist, in which there were (suppose) ten or twenty pretenders to the crown, all claiming the royal authority? in such case it would be no difficulty to foretel the state of such a kingdom.

I there-

I therefore leave the readers to judge whether these authors, aware of this absurdity, and apprehensive of the unhappy consequences, did not out of design wave that title; or for some other reason. But to proceed.

May we not also argue against this notion from the prodigious number of Drones? if one single Bee, (suppose a female) be sufficient to produce ten or twelve thousand in one summer, what occasion can there be, or necessity, for many hundreds, nay some times thousands (as in strong flocks or colonies to my knowledge) to copulate with one female; reason and common sense will tell us a much less number must be sufficient and effectual for such a purpose. Why should such numbers of these be produced for the sake of one Queen, when few would be sufficient?

We find it so among the fowls, which we observe in pairs; one male, and one female; and among the beasts of the field, we frequently see one male impowered to serve an entire herd or flock; why may it not be the same among insects?

I very well remember the *Croydon* physician quarrels with king *Charles's* Bee-master for making a bull of his king.* Thus he writes; a Bee is first an egg, and not as Mr. *Rusden* ignorantly supposes, made of animable matter (where he greatly mistakes the apothecary, and wrongs him,) gathered by the Bees from flowers, and cast into the combs as their proper matrix; then he makes a King-Bee, and presently makes a town-bull of his king, going from cell to cell, and casting his seed in-

to every cell. The attentive reader will, no doubt, put a remark hereon ; a town bull, and yet nothing of engendering or copulating with any female whatever, Queen or common Bee ; and I leave him to put what censure he thinks proper upon the Doctor, who treats his Queen as bad or worse, publickly proclaiming her a common prostitute ; a base, notorious, impudent strumpet ; the most hateful and abominable whore, with gallants by hundreds.

Thus has he unawares highly injured her honour, attacked her in the most tender and affecting part ; robbed her of the most precious possession next to her life ; ruined her character ; and stripped her of one of the brightest jewels in all her crown ; indiscretely exposed his Queen to publick contempt and scorn, and shewn her no mercy. For if this be admitted as a truth, what is become of her so much boasted, admired chastity, wherein she appears such an eminent pattern to the human species. I think therefore, upon the whole, it cannot be at all unreasonable to conclude, that such numbers of Drones must be produced for some other purpose, and have some other office or employment assigned them ; being no way necessary for the work of generation.

But to enter into the merits of the cause, and bring the debate to an issue, I add as follows : it is matter of fact, and known to all who have any acquaintance with these insects, that they not only begin to breed early in the spring, (sometimes in the middle of *January*, or else in *February*, &c.) but also proceed therein several entire months ; and considerable numbers, or many broods are continually compleated, before one of these supposed males are to be seen among them. These

These Drones make no appearance, nor do they exist till the hives are near filled with Bees, and the swarms in great forwardness; but are expected in a short time after these are seen.

It is too evident to be contradicted or disputed, that the Drones are all expelled, and slain at the close of the preceeding summer; the latter end of *July*, or in *August*, if the Sovereign is in safety. Hence it follows, there can be no Drones in the hives for at least eight or nine months together. This is true in fact, as I have always found at the time of union, when not one Drone is to be seen.

A modern author then was greatly mistaken,* when he tells his reader that a small number of these are left, a few of them reserved, to supply the necessities of the ensuing year. Which circumstance (says he) I the rather take notice of, because the Queen is pregnant again in the spring, tho' the Drones that are amongst them are very little, if any larger than the common Bees. Another of his numerous errors!

Then he tells you in the same page, the poor Drones are exposed to the wide world; and their circumstances are doubtless very deplorable. In all probability they associate with the wild Bees. A wild notion!

In short, it is a difficult matter to say justly what becomes of them. Why such a difficulty? when every common Bee-master can easily account for it; great numbers of them being slain, and often appear in heaps, before the hive or colony; and the rest of them forced out

out by the commons perish without doors, as is easy to observe in or about your apiary, and adjacent parts.

How defective this author's acquaintance was with our insects appears by these instances, besides many more. To return to the argument.

That these insects should continue in a state of pregnancy for so many months, and then produce young, and several broods successively, one after another, and this without the presence and concurrence of the male, is to me (I profess) a mystery, unaccountable and unintelligible; not to say impossible. Since so many generations are bred before the Drones do appear, it is not possible they should be either males or females.

That such an impossibility may more fully appear, and so give the argument the greater strength and force, I remark, that to my own certain knowledge, the Bees sometimes breed all the summer season without Drones. Several poor and weak stocks, which have but few Bees, and but little honey, have not any Drones among them all the season; and yet these shall encrease, prosper, and breed Drones the following summer.

This is what I have many times observed, know it by my own experience to be true in fact, and as such I publish it to the world, and for proof, I will give my readers only one instance instead of a multitude.

Once I had a stock of Bees, which not only bred great numbers all the spring-time, but also swarmed without any Drones, as I was fully assured from the most strict and constant observation. Had there been one single Drone in it, my eye or ear would certainly have discovered him.

The

The old stock continued to prosper, as before ; and in about a month or six weeks after the swarm, some Drones (tho' few comparatively) appeared in it.

The new stock (or swarm) increased in numbers all that summer ; but had no Drones among them till the following spring.

It is abundantly evident from hence, this stock of Bees had no Drones among them for the space of ten or eleven months.

And I add further, that I have oft-times known weak stocks, that have not bred Drones for the space of about two years.

From the premises may we not very justly draw this conclusion, that Drones are not the males, neither have they any instrumentality or agency in the generation of Bees. It hence appears absolutely impossible.

And if this point is yielded us, then I am most fully persuaded that they do not breed by copulation ; the common Bees being neither males nor females. Were hive or colonies ever so well replenished with both these sorts, they would not be able to produce one single Bee without the principal or Sovereign. Without the Queen they cannot breed.

It is well known that one single female-wasp, without the assistance of the male, is sufficient to produce a whole nest of eight or ten thousand in one summer. Why might not the Queen-Bee effect the like, had nature furnished her with proper tools or instruments for erecting the cells, and providing food for the young ? but both these services are assigned to the commons, whose

whose property and peculiar province it is to prepare the matrixes, and collect and administer fit matter for the nutrition and growth of the worm, or foetus, till it comes to perfection, and is able to take care of itself, and then the most diligent and tender nurses are fully discharged from their office.

It is most certain that the prolifick substance or matter which is deposited in the cells prepared and appointed for procreation, and which after a few days quickens, and appears a little worm or maggot, proceeds from the Queen-Bee alone.

The question then, in order to decide the long dispute, *viz.* whether this Bee is male or female, is whether the said matter, thus placed in the several matrixes, is (in nature) sperm, or an egg.

I will briefly propose the reasons which have induced me to embrace the latter opinion against the ancients, and some moderns, and conclude this Bee to be a female, and the only female; *viz.* that manifest and constant identity, which is very obvious both in the dimensions and form of it; together with it's different parts, or composition.

The identity, or perpetual equality of it's several dimensions. Examine these most strictly, and compare them together as oft as you will, and no inequalities in their bulk and magnitude can be discerned, no alteration or difference among them; they always appear the very same.

Again, its invariable form, (an oblong figure) may be a further evidence. The most diligent and curious attention

tention will not be able to find out any the least alteration or difference here. The two ends are more protuberant than the middle, which is more slender, and this is the form of it in the belly of the insect, and even after it is deposited in the cells for several days, till the time it quickens, and appears a perfect worm.

And thus we find it in the eggs of other insects and animals, which are remarkable for their proportions, different figures, colours, regularities, exact positions, &c. particularly the silk-worm.

If then neither of these can be safely affirmed, or fully proved, of the sperm in man or beast, that there never is any difference, either in the quantity or the figure, then it must be admitted that it is nothing but an egg, and consequently that this creature is of the female kind.

But I add, as a further evidence in the case, and what is more fully convincing, it's different parts, which compose the whole, and are easily separated and distinguished from each other, as I have often proved, placing the insect upon my hand or an handkerchief, she has (moving upon it) laid several of these oblong substances, and to all appearance as full of spirit and vigour as at first.

I have immediately examined these, which still keep their form, while you gently move them up and down; but no sooner have I by the help of a needle penetrated the same, but the whole most plainly appeared, (even to the naked eye) to be a fluid, or liquid matter, contained in a thin skin or membrane; and without any the least difficulty separated the one from the other. Tho' Mr.

Rusden

Rusden says it is not an egg, but sperm, and hath no skin to keep it in it's form, as the eggs of silk-worms.* But how can we imagine this to be any other than an egg; no sperm being enclosed in a shell or membrane, as this is? whence it will naturally follow this is a female. Mr. *Bradley* says it is an egg, formed by a thin, white, and smooth membrane.†

From the aforesaid remarks, I have taken the liberty to dignify this insect above the rest, and to distinguish her by the name of Queen, answerable to the title-page.

Yet after all that hath been offered upon this head, it seems to be a moot point, that will admit of a further debate. As I cannot attain to a full satisfaction herein myself, how can I expect the arguments should administer the same to the readers, whom I must leave to his own judgement and choice. Nor will I quarrel with any person, though he may perhaps apprehend some reasons for not embracing my opinion.

Thus are we humbled thro' our own ignorance. Here we see how our intellectual powers are confined and limited; not an insect, a pile of grass, a single hair, or an atom, but is enough to puzzle the skill and wisdom of the greatest philosopher.

And thus has God punished our pride and presumption in aspiring to be as Gods, knowing both good and evil.

Since then there are such secrets and mysteries in the kingdom of nature, as also of providence; why may there not be the same in the kingdom of the Redeemer? ‡ or why

* *Rusden*, p. 45.

† *Bradley*, p. 233.

‡ 1 Tim. iii. 16. *μεγα ἐστὶ τὸ τῆς εὐσεβείας μυστήριον.*

why should these be any objection against the christian religion, so fully attested by it's divine author, and confirmed by so great a number of incontestible miracles, which were his credentials, the evidences of his divine mission, that he really came from God, and was no impostor or deceiver? one remark more relating to the Drones shall close this section.

If these insects (whether males or females) minister nothing towards the multiplication of the species; if we allow them not to be the fathers of the family, the parents of so large a progeny: of what use or service are they in the state? as nature doth nothing in vain, it is but reasonable to suppose they have some peculiar province, or office appointed for them.

In answer to which many, who have treated on this subject, tell us, they are, by their numbers and bulk together, greatly helpful in hatching up and hastening the young brood.

But this is not without objections. Hitherto I never could observe any material service done to hives or colonies by their means.

It is certain, that several sets or broods of young Bees are perfected, and engaged in the useful and common labours, before any of these appear in the hive, or have an existence; no Drones being produced till the latter end of *April*, or till *May*; many times not before *June*, or *July*; nor all that summer in poor and weak stocks.

And it is a very frequent and common observation, and experimentally known, not to a few, that considerable numbers are hatched, and the hives well replenished

ed with common Bees, and ready to send forth new colonies or swarms, before these are in being. How then is this possible? I wish these wise and penetrating gentlemen had better instructed us, and let us into the profound mystery, and told us how, or by what secret and cunning art they contributed so abundantly towards the lives of others, so many months before they had received any of their own. At that time, and all that time they were mere nullity, non-entities, and had no power of acting.* How highly, how infinitely obliging to the world, had but these miracle-mongers communicated their *Nostrum* to others, laying so great a mystery open to mankind, which now must remain just as it was.

Again I object, it is as universally known, that the Drones are entirely expelled the end of *July*, or the following month, and yet the Bees continue their breeding thro' *August*, *September*, and part of *October*, if the season is encouraging.

In one hive, which I took at *Michaelmas-day* last, I found considerable numbers of young brood in several combs in different degrees of perfection (tho' all of them close sealed up;) some maggots, some nymphs, and others perfect in all their parts, ready to make their publick appearance, or actually discharging themselves from the disagreeable confinement.

Besides, it ought to be here remarked, that even those stocks, which have no Drones among them, breed their young (proportionably to their numbers) with equal expedition and dispatch, with those which are full of Drones,

as I am able to attest from my own personal and multiplied experiences; which methinks tends not a little to diminish their nutrimental influences.

Nor should it be forgot, or overlooked, that several weeks before their total expulsion, they gather together in a distinct body by themselves, separate from all the rest; as tho' they entered a most solemn protest against all future conversation with their ancient friends and allies. This have I frequently seen towards the end of the season at the back-window of the boxes; and others may do the same.

Let the reader then inform me, what manner of influence they can have in the hive, in order to accelerate, or hasten the brood; or whether any at all.

I will enlarge no further upon this article, so subject to contention and debate.

The Method of Generation more particularly considered.

AS the preceeding section is not only copious, but also preparatory to this, there will be the less occasion to dwell here; therefore I shall in brief represent the process hereof, as it appears to me thro' the whole season.

Bees begin to work and breed earlier or later in the spring, according as the season is more or less encouraging: according as the flowers appear upon the earth, and the weather will suffer them to go abroad.

In a very warm and early spring I have found them at their foreign labours about the middle of *January*; at other times in *February*; but in a very cold and late

spring not before the end of *March*, as after the severe frost in the year 1740.

The fullest and richest stocks generally begin first. And tho' they begin in *January*, they continue their brood till the honey-gathering is past, tho' it were to the end of *August* or *September*.

The physician then must have been mistaken,* when he told the world, that the sooner they begin the sooner they make an end; for it is not the length of time, or the number of months, but the plenty, penury, and want of materials to employ them, and work upon, that determines their labours. To my knowledge Bees have been bred as late in the year as *October*.

Hating inactivity and idleness, as death itself, these industrious insects begin early, and continue to the last. Labour is their dear and delightful employment.

*In morn these busy lab'ers cut the sky,
Thro' all the gardens and the meadows fly;
And free from envy, by their labours strive,
Which shall do most t' enrich the common hive.
Such is the employment of their happy days,
And such their title to immortal Praise*

Dinsdale on Bees.

Now begin these most active creatures to traverse gardens, fields, and groves, diligently searching for proper materials to increase their numbers, and to improve their store.

* *Warder's Amazons*, ch. 3. p. 10.

But

But the flowers being but few, their first importations are so small and inconsiderable, that without a very close, strict, and accurate observation, they will easily escape our notice. Yet as the spring comes on, and flowers, &c. increase, their burthen becomes more visible.

Now since Bees (as confessed on all hands) breed not till the flowers furnish them with proper food for the young foetus, and they are seen to transport this matter daily to their hives, it should seem that it is collected for no other use, nor devoted to any other service, than the nutrition of the young while in the cells, and not as bread for them afterwards.

The more of this matter they carry in, the greater numbers are produced; and the hives fill the faster; a plain intimation to me that it is thus employed.

In the midst of summer, when there is the greatest plenty of honey, and they have not only enough for those of their own family; but for as many more, they continue the practice as in the spring; a clear vindication (methinks) that the said matter is purely intended for nourishment to the young in the cells, and for no other purpose, nor appropriated to any other use.

Mr. *Rusden* also observes, that the more plentifully this matter is transported to their hives, the greater quantity of water is carried at the same time, without which they cannot breed. And as the collection of these two different materials are assumed, so likewise are they discontinued and laid down together.

But I have met with a late objection against what I am now disputing for, from a gentleman in *Bucks*, who

has been about the space of twenty years very curious in his remarks and experiments, having kept Bees both in hives and colonies : whom my first proposals brought into my acquaintance.

He objects, saying, he cannot believe the said matter is converted or applied to any such use, because the liquid, in which the worm or maggot swims, is not in the least discoloured by such a composition or mixture. I cannot say such a thing ever occurred to my own thoughts, yet to me the objection seems not to carry sufficient weight to turn the balance, nor to be of force enough to invalidate the contrary evidence, because the quantity is so small, and the mixture so exceeding fine, that they cannot be easily distinguished one from the other.

If it be further objected, that there are frequent occasional additions of the said gross matter to the other ingredient in this alimentary composition, I reply, it is the same as to the water, both together being duly intermingled in the fittest and most just proportions.

Who then will, or dare affirm, the element of water alone would as certainly and effectually answer the noble design, as water together with select and peculiar matter collected from the flowers, when nature hath taught these insects this necessary composition.

It is perfectly needless to observe the many noble and most excellent designs, subserved and accomplished by a prudent mixture of flower and water, which is the constant support of human life. Men cannot live without bread : yet these separate and alone could never answer such a purpose. Why then may not these two ingredients

redients (carefully united) answer the end I am pleading for ; being so admirably adapted to the growth and augmentation of the young, till such time as they quit their cells, and begin to live after another manner ; having other means of subsistence, and a power to feed themselves.

Moreover, to remove or abate the force of that, or any other such objection, I must acquaint the reader, after some stocks have for several weeks conveyed lesser or larger quantities of the abovesaid matter into their hives ; I have very strictly examined, before any young, (or very few if any) had left their places of retreat, (*i. e.* their matrixes ;) but nothing of it was to be found alone. To what other purpose then can it be appropriated ? there being no young, or next to none, to feed upon it.

To me it appears designed purely as matter of nutrition to the *Fætus* in the cells ; and no otherwise employed. May we not from the whole justly conclude, it can be of no other service, than to nourish the young.

If it is not thus employed, and converted to this use alone, I would gladly learn where and how it is disposed of, seeing nothing of it is at that time to be seen in the same form it was carried in ; but curiously mingled in the breeding cells.

With this the Doctor says the Bees feed their young. If he means the young in the cells, before they break thro' the inclosure, he says the same thing with *Rusden*, who oft affirms this mixture is put into those cells, wherein is the egg or sperm only as matter of nutrition.

But if the Doctor means, that this is food for the young Bees after they are bred, and abroad in the hive, (else he says nothing to the purpose) I deny it; well knowing, that both Queens, Commons and Drones, live only upon honey. In many hives, little or nothing of this matter is to be found in the void and empty cells; Bees in such hives or colonies must most surely live upon honey, and that alone.

Let us for once suppose a stock supplied with the greatest plenty of what some call Bee-bread; I dare to say it, from frequent observation and experience, they would certainly, and speedily perish, if at the same time they were destitute of other support.

Oft have I found this verified, greatly to my disadvantage; many stocks at the end of *May* full of Bees, and the swarms daily expected, thus miscarrying; not for want of that sort of bread, of which there was sufficient store, but for want of more agreeable and necessary food. Great numbers being bred that spring, all the former provision entirely spent, and little honey to be had abroad, both old and young have died together; which I am very well assured would not have happened, had these authors been right in their sentiments; the Bees of the said stocks having for the space of three months or more carried very large quantities of that sort of bread into their hives, which was found therein; and yet the inhabitants died of famine, and according to these gentlemen perished in the midst of plenty. I have known
both

both single hives and colonies languishing and dying the second week in *May*, merely for want of honey.

Therefore the Doctor's observation was very true, *viz.* if in spring a stock is not very rich in honey, and much cold weather comes to hinder their works, they will be in great danger of being lost. The brood encreasing, the old store spent, and none to be got abroad, they all perish together. Therefore the stocks that are fullest of Bees without a sufficient store, are in the greatest danger.*

They begin to breed in the upper part of the hive in the empty cells, next adjoining to those that are filled with honey; gradually descending to the lower parts, also enlarging the circumference, as the flowers encrease, furnishing them with greater plenty of useful and necessary materials, till the brood is carried to the outermost parts of the combs.

The Doctor tells his readers, the eggs are cast only into the middle cells appointed for breeding, while those round the hive are reserved for the honey; nature, or the God of nature, having taught these creatures, if they should place their eggs near the outside of the hive or box, sufficient heat would not come to them, to hatch and bring them to perfection; which inconveniency they carefully avoid, by laying their eggs close to one another, near the center of the hive or box. No eggs (as he adds) are laid nearer than three inches towards the top, bottom, or sides of hives or boxes; and thus their natural heat always keeps them warm, raises them in gra-

dation, step by step, till they are hatched and come forth perfect Bees.*

Here also I must differ from the Doctor, who had so long kept Bees in colonies, on transparent boxes, which gave him the opportunity of viewing them at all seasons, I wonder he was never sensible of his mistake, which a little attention would have discovered.

Here therefore I must oppose the Doctor (not for opposition's sake, but because it is matter of fact) and tell the world, what I have frequently seen myself, and shewn to many others, the young brood in the outermost parts of the boxes and cells close to the back-windows. First the egg, afterwards the little worm, daily encreasing till sealed up in the cell and at last opening a passage thro' the enclosure of wax, and forcing it's way out, perfect in all it's parts, tho' not at it's full growth and maturity, which several days more in the hive are necessary to accomplish.

It was an error therefore in another author, to say the very day they quit the cells in which they were bred, you may see them at work abroad, and bringing wax into their hives; which I am well assured, for some time, they have not an ability for.

It is easy many times to observe, when a swarm rises, many of these young Bees forced out in the croud and hurry, creeping about the ground before the hive, but unable to fly, and return to their former residence, or keep company with the rest; and consequently must perish.

* *Warder*, p. 14.

The first step towards generation of Bees is the egg, deposited by the Queen in the cell, or matrix prepared for that purpose. Mr. *Rusden* writes, that the sperm of the King-Bee is injected into each cell after the Honey-Bees have first put in some generative matter.

I have frequently upon trial found the contrary, eggs in the cells, without any of the said matter mingled with them, therefore I deny the assertion; as also that the matrix is stopped close up, and covered with wax, at the first mixture.*

The egg thus fixed in the bottom of the cell keeps for a few days, (as long as it remains without life or motion) it's form, or situation, without the least change.

It's next appearance, or form, is that of a little worm or maggot, and nothing more, turning itself into a round or semicircle at the bottom of the cell, where it floats in a proper liquid, whereby it is nourished, and it's bulk daily encreased.

What the nature of this liquid is Mr. *Bradley* tells us cannot be known, by reason of the smallness of it's quantity; and therefore we remain in doubt whether the same be honey carried thither by the Bees, for the nutrition of the embryo, or some other matter proper to fructify the sperm.†

Certainly it is not honey, nor hath the taste of honey, but only water mixed with the matter before mentioned, gathered by the tender mothers, and placed in the said cells, as proper food for their support.

Mr. *Bradley* further says in the same page, of what nature soever this first liquor may be wherewith the small worm

* *Rusden*, p. 55. 56.

† *Bradley*, p. 234.

worm is encompassed, it is certain that the Bees afterwards carry honey for it's nourishment, and bring them a greater quantity of food, in proportion to their growth, till the eighth day; after which they take no further care of these young ones, but stop up all the cells. That the said nutritive matter is gradually increased, as the worms grow, I entirely agree with him; but that the Bees, carry them honey for their nourishment there, I absolutely deny; they taste no honey more or less, till they come out of the cells, and commence perfect flying insects, are able to feed themselves, and are no longer fed by their tender nurses, as the birds usually feed their young, tho' some writers have said as much, and misled their readers.*

No sooner have they forced a passage thro' the prison doors, (of which I have been very oft a delightful spectator) but I have seen them searching after honey in the neighbouring cells; which henceforward is their only food.

After the little worm, continuing so long in it's first form, is grown to such a substance, that it can continue no longer in that posture, erecting it's head, it directs itself towards the mouth of the cell.

When it is arrived at a certain bigness or stature (a sufficient quantity of suitable food, to bring the embryo to perfection being put into the cell) the Bees closely seal it up, taking no further care about their young: having faithfully so far discharged their office, they have nothing more to do, but by a natural heat to cherish the brood, and hasten the birth.

And

* Purchas's Theatre p. 55. *Warder*, p. 26.

And now follows the strange and admirable metamorphosis. It is manifest, that most insects pass thro' a very great variety of transformations, successively assuming the form of one living creature, and then another, between which there is not the least resemblance. Yet the wonderful change is progressive and gradual; first in one part, and then in another. Opening one of these matrixes, wherein is enclosed the embryo, whose improving change approaches; what do you behold but an ugly worm, or confused mass of corrupt matter! yet in that putrid mass are implanted and sown the seeds of so noble an insect.

Thus it lies hid from the eyes of all the living, seems to be intombed, and buried in it's grave, without any the least sign of life; yet have patience, and you shall see the noble creature rising, as it were, from the dead, perfect in all it's parts, and in the most beautiful form, far more glorious than that laid down. A most lively emblem or image of the resurrection!

The like image of the resurrection, the author of our holy religion hath given us in a grain of wheat, which must perish and die, before it can multiply, and bring forth fruit.* *To every thing there is a season, and a time to every purpose; a time to be born, and a time to die and rise again.*†

In this intermediate state is the principal and most affecting transformation. The worm thus interred or sealed is converted into another living creature; conceived a second time and born anew; immediately commencing

(according

* John xii. 24. compare 1 Cor. xv. 36.

† Ecclef. iii. 1, 2.

(according to naturalists) a nymph or chrysalis : and resembles (not a little) an infant wrapped in it's swaddling-cloaths.

Now the several parts begin to appear, and may be easily distinguished from each other ; first the head, and therein the eyes, wherein the colour is observed first to alter and change to a light yellow, then to a deep dark brown, and then to black ; afterwards all the other integral parts or members, as the legs, the wings, horns, with the other two divisions.

What human mind can fully account for these mysterious changes, how mysterious is nature in her operations ; which not only puzzle and deceive our bodily sense, but also so far transcend our intellectual powers ! ‡

It is disputed, whether the insect actually dies at the time of it's transformation. It is a living creature before such change ; hath it's peculiar form, furnished with every member suitable to it's nature ; and bears not the least similitude to that winged insect, which is substituted in it's room, and occupies it's place. Thus divested of it's essential parts, must it not inevitably die ? doth not the deprivation of the essential parts necessarily imply the destruction of the whole ?

There is a living embryo in the preceeding animal ; yet if we regard it's form and manner of subsisting, (*quoad hoc*) it actually dies, and gives place to a successor.

At last having gone thro' all these changes in the space of 18 or 20 days, it is a perfect Bee : and seeks to discharge itself from a confinement, no longer to be borne,

with

‡ Eccles. xi. 5.

with it's jaws opening a way thro' the cover of wax, which secured it in the cell from the chilling air, and every other injury. Now may you (at the glass window) see one horn appear, then the head entire, and afterwards the whole body (as the passage is dilated) disengaging itself; of a lightish grey, or ash-colour; and as yet in it's infantile state. In about a week's space it comes to it's natural complexion, arrives at it's full maturity, and is fit for labour.

Then may you about mid-day, see the young brood fallying out of the hive in considerable numbers; after various semicircular wheeling motions, taking wing, turning their faces immediately towards the hive or colony, very strictly marking the same, as they (in enlarging their circuit) do all the other adjacent parts, and the whole neighbourhood.

In a little space of time, having emptied and recreated themselves, they return with like diligent and curious observation, the more perfectly to understand their situation, and place of fixed residence.

Thus ready and every way prepared for action, we may suppose them the next day to begin their most useful, faithful labours, which end only with their lives.

The shattered remains of wax, which sealed up the cell, the other Bees remove, as of no more service; and no sooner is the matrix cleansed, and fit for new fecundation, but the Queen with another ovum impregnates the same.

And thus is there a constant succession of young brood, never totally discontinuing all the season. no not in an honey-

honey-dew. Of which more in the next chapter, where will be considered the agreeable, and most commodious habitations they build for themselves, both as magazines for their treasure, and nurseries for their young; the materials they employ therein, together with the ends and uses of the same, as also the method wherein the entire structure is accomplished.

The Drones owe their original to the same cause with the Honey-Bees; generated after the same manner, and with the same circumstances, except in different matrixes or cells, designedly built for them in the Drone-comb: of which there is one in each hive; often two; and sometimes I have found three.

At other times I have observed the same comb composed partly of cells for the Honey-Bees, and the other part of the cells for the Drones; such a one I saw in an hive in *October* 1743. But it is no new thing; I have seen it frequently; and many more, no doubt, have done the same.

But as there is so great an identity betwixt the generation of these two sorts, it would be a vain and needless repetition to run over the preceeding particulars.

The production of the royal issue, or the regents, is more peculiar, and very different from the other two. Generally near the edges, and at the bottom of the combs, and sometimes from the sides of an honey-comb, are erected several oblong orbicular cells, of great strength, especially that part which is it's basis in which these princesses are bred.

Of these royal mansions or pavillions, a modern writer says there is always one in every hive, in some two, in others three, tho' but seldom.*

But frequently I have seen these oblong royal matrixes or pavillions in greater numbers; particularly in *October* 1743, no less than seven or eight at the bottom of one comb, besides several in other parts, tho' few of them in full perfection. Mr. *Purchas* mentions nine or ten, tho' the number is uncertain; in some more, in others less.

This royal cell I have examined, and found an inch in depth: these are never demolished. Into these cells, Mr. *Purchas* says, is injected a sperma matter, inclining to yellow; wherein, and out of which, the Queen-Bee is bred, being both matter of generation and augmentation; and that she is at first, (when she is visibly any thing) a perfect Bee, in lineaments and shape, tho' not in magnitude and dimensions, and feeds on that wherein she is bred, till she comes to perfection.† The golden matter, of which the Queen is made, is not turned into a worm, but immediately receives the shape of a Bee.‡

Doth she feed purely of a spermatick matter; and that matter injected by a female? and is sperm, and sperm alone, matter both of generation and augmentation? and how will he prove, that tho' both the other sorts are produced in the manner represented, and the young nourished by proper food duly prepared, this principal Bee is generated, nourished, and perfected without any ministrations, or contributions of the Commons. Tho'

* *Dr. Warder* p. 44.

† *Purch. Theat.* ch. 8. p. 29.

‡ *Butler's Faem. Monar.* pag. 62.

Tho' I allow a prolifick virtue in his spermy matter, yet surely some nutriment or other is of absolute necessity to it's improvement and perfection.

Certain it is, whatever that worthy divine has published to the contrary, that those of the royal race are generated in the same manner with the Commons and the Drones, tho' in cells appropriated to themselves. And that in those cells they are nourished by a very select and peculiar matter gathered by the Commons. What the said matter is, or whence it is gathered, is not easy to determine. Yet that it is really peculiar, and very different from that gross matter, which is employed in nourishing the other young, I cannot but conclude from what I have found, and taken out of the royal cells, of a very different kind and quality; being of a gummy, glutinous nature; of a deep red, transparent; and would rather dissolve and melt in the fire, than crumble to powder.

But that this matter is put into those matrixes first, and the sperm of the King-Bee injected afterwards, according to Mr. *Rusden*, I take to be an error.*

One thing here seems not so easily to be understood, namely, how the matter thus prepared for the nutrition of the royal foetus, and formed into a proper liquid, should be retained in those orbicular cells, being built perpendicular, and the mouths pointing, and hanging down directly towards the stool or floor; turning up an hive full of combs, these royal pavillions will immediately present themselves, appearing in the form and posi-

tion

* *Mr. Rusden*, p. 54.

tion now mentioned; yet the thing is true in fact, and may be accounted for.

It is also an uncertainty what numbers of these are bred in a single hive or colony. Dr. Butler† tells us, he once took up eight of these together brought out of the hive, when two at least were gone forth with their swarms, and that in 1633. as he received it from a good hand, there were bred in one hive no less than seventeen.

I dare not deny the truth of the report, but take the liberty to observe, that some circumstances in the story make it (with me) the less credible; for instance, that two went out with the first or prime swarm; which I never found, unless once or twice in forty years; five brought out dead before the second swarm rose, with which five more were brought forth; and the same number brought out dead the next day; and yet one continued calling the day following. I only note, it is not usual with the Bees to expel the royal issue, till after the swarms are all come forth; nor are they so long in expelling these supernumeraries; the doom being once passed, the execution is quickly accomplished.

It is above twenty years ago since one of my colonies rose contrary to expectation; but I presently found it was entirely owing to my own mismanagement and neglect, in not supplying them time enough with another box. About ten days after, the cast arose, which I presently returned to the colony, and which I was very sensible would greatly suffer by taken away from it such a body, after the swarm was gone. After they were thus return-

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ed;

† Dr. Butler, p. 4.

ed, they rose again four times, and I returned them as often ; at twice I took from them two commanders, four at two other times, and another time three; being nine in all : after which they rose no more. The remaining Sovereign, and the other which went out with the swarm, made them up eleven in all, which I concluded was the whole number bred in that colony, not finding any other expelled and slain.

But as a single flock seldom swarms oftner than twice or thrice, and a few of the blood royal are sufficient, it is very probable the number seldom amounts to so many.

Our numbers thus multiplying, and hives filling apace, and ready to grow up into more families, in swarms soon expected, the next thing to be done, is to provide them convenient habitations ; which leads them to take a survey of their skill in geometry and architecture in the following chapter.





C H A P. V.

Of the Bees Works, &c.

HE more agreeably to entertain and gratify the reader, and proceed the more regularly, I will begin with the new swarms, and follow them *gradatim* thro' the whole gathering season.

No sooner is the swarm of Bees hived, but they begin to build their combs, whether for increasing their numbers, or treasuring up their honey. So earnest is their application hereto, that in a week's space (the weather favouring) the hive shall be half, or two thirds filled with combs; which surely must be on all hands acknowledged an inimitable performance. A diligent observance of the most admirable structure, it's regular contexture, it's strength, beauty, and designed usefulness, must force one to acknowledge it a most curious and incomparable piece of architecture; which, however it may be imitated, can never be equalled, much less exceeded, by the greatest artist among mankind.

But the first thing here that demands our attention, are the materials of which this noble fabrick is composed.

Some ancients were of opinion, that some tough and glutinous matter (they knew not what) was the

foundation of their work. And I find some of our moderns inclining to the same opinion. Mr. *Bradley* says, that they may fix their work at the top of the hive with more solidity; they use a tempered wax; almost like glue.* Bees gather two sorts of wax; one brown and gluey, which serves to stop the holes, and fix the honey-combs to the hive; the other for building their cells.

A later writer has told the world, that the materials are composed of nothing but glue and wax, which they extract from various flowers.† Had he said the materials had been wax, he had been nearer to the truth.

Whatever these, or any other gentleman may fancy or affirm, I do upon the fullest evidence declare, that the combs, both in their foundation and superstructure, are framed of nothing but pure wax. I dare appeal to any judicious and impartial person, who will but make trial for the truth of what I assert. Let it but be examined by fire, or in any other method, and it will be found to be wax, and nothing but wax.

The manner in which the edifice is carried on and accomplished, together with it's form, comes next to be considered. Their manner of building is greatly different from that of the wasps, as well as the materials.

The wasps build their combs horizontally, placing them one above another, in several stories, supported by numerous and strong pillars; in which, and all their other works, they use the utmost application and dispatch.

But

* *Bradley's Husbandry*, p. 225, 238.

† *Nat. Delin.* p. 97, 103, 104.

But the delightful Bees build their combs perpendicularly in a right line, hanging from the summit, or top of the hive, down to the bottom.

They lay the foundation of every comb at the top, or upper part of the hive, and carry it down to the floor, from side to side, fastening every comb to something solid, and able to support it.

How they manufacture the wax, fix it to the hive, and fashion it in so curious a manner into combs and cells, we cannot easily account for. Yet we see they are perfect masters of their art, and understand how to temper the wax by heat, or by some other means mollifying or making it pliable and fit for their purpose, and to answer very valuable ends.

The principal implement employed in fabricating their combs, appears very plainly thro' the glasses, to be their mouths or jaws. I have frequently been a diligent spectator at such times, yet either thro' the number of Bees about it, the continual motion, seeming confusion, or else the expedition, and quick operation with which their work is carried on and finished, I never have been able to enter into the secret, and therefore must let it pass as impenetrable.

Dr. *Butler* observes that the artificial cells, which serves both for store-houses for their treasure, and nests or nurseries to breed their young, are made of matter they gather from flowers, and wrought into combs; but done so nimbly, that it can scarce be perceived.

These cells sure may be esteemed to be one of the most surprizing and exquisite pieces of workmanship.

They are all hexagons, built on both sides of the comb, but a cell on one side is not placed directly against a cell upon the opposite side ; but the basis of a cell on this side answers to three third parts of the hexagonal basis of three contiguous cells on the other side, meeting all in a right angle in the center of the opposite bottom, which serve both for elegance and security, strength and beauty.

Thus they appear masters of geometrical measures and inventions : all the cells thro' the hive are regular and perfect hexagons, and equilateral ; are supports to each other, and wisely and artificially contrived ; the wax being distended into the finest and most curious membrane possible, which framing numerous cells most closely connected with one another, the whole fabrick is effectually supported.

It is surprizing to see so many thousands of these insects, merely by natural instinct, framing their combs with so great a curiosity, regularity and order. But a strict and diligent view of one of these combs newly erected, will enable the reader to form a more just and perfect idea thereof, than the fullest description given of it by the pen.

Moreover, there is this advantage in it's figure, that there is not the least room lost ; no vacuity or empty space thro' all the hive. And such is the delicacy and fineness of the compofure, that when the cells are filled with honey, they appear as one single and solid body.

The square, together with the equilateral triangle, have the like advantage ; yet seem less capacious and extensive, this figure having a greater affinity with the sphere.

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The combs are also (generally) placed at equal distances, there being only room for two Bees to pass abreast, without any needless empty space. Wax is one of their chiefest manufactures, and absolutely necessary to treasure up their honey, and for brood. But here I find several of our modern writers far from truth in their reports.

Mr. *Bradley* tells us, that from the flowers they gather the wax with the hairs, which cover their Bodies; and when they return from the fields, you may see their hairs full of small particles of wax like dust. When they are got into the hive, and give notice to their companions, three or four of them come and take each a small quantity of the wax, with their jaws, till no more remains, when they return into the fields for a new harvest. Or else the laden Bee finds out a cell, where there is neither honey, nor worm, and there leaves those bodies of wax.

He likewise adds, as one Bee goes, another comes, to temper the wax till the hive is almost full of this sort, placed sometimes in lays of divers colours, as white, yellow, red and brown, according to the flowers or leaves from which they gather it. And in several parts of the hive, a great number of cells are found full of this wax, which are as magazines, to which they have recourse upon occasion. Finally, the wax in the cells, which at first is of different colours, is always white immediately after the honey-combs are built.* How has this author in this account betrayed his great ignorance, and abused his reader?

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That

* *Bradley* p. 239, 243.

That such quantities of wax are deposited in the empty cells, I never, thro' so long an acquaintance with Bees, could observe, and know it is a great mistake, neither is the wax, as gathered by the Bees, of different colours, but always white, and the slightest examination would have been sufficient to have convinced him he was in an error: nay the diversity of the colours alone, if attended to, would have done it.

And as there is so manifest and great a contrariety in nature between dust and wax, it must be an unpardonable weakness in such a professor thus to confound them. That the wax placed in the cells should be of such various colours; and immediately (when formed into combs) white, is very strange and unaccountable.

In this article we also find a modern *French* author guilty of the same error, telling us they always keep a considerable stock of this in reserve, collect it in their hair, with which their bodies are plentifully covered over, and it is agreeable to see them roll in the yellow dust, which falls from the chives to the bottom of the flowers, and then return invested with those grains. They also, according to him, carry away the little particles of it with their jaws and fore-feet.

These collectors at their return have proper assistance and attendants ready at the hive door, on purpose to ease them of their loads, as soon as they arrive; whereas the former repair to the field again, in order to collect new store, while those which helped to unload, convey their charge into the general magazine; yet some of the other
convey

convey it to the apartments, and unload it themselves.* But that is a work of supererogation. And why not all of them? all this is so entirely fancy, and far from fact, as to need no further confutation.

That I may more fully satisfy my reader in this point, and at the same time shew how remote the said authors were from truth, I subjoin the following remarks.

It is so fully manifest and obvious, that what is for several months together so plentifully imported into the hives, is not wax, nor hath the least affinity with wax, that it is not to be contradicted, tho' several of our writers contend for it, and it is generally accounted such by the populace.

Both *Butler*, *Purchas* and *Rusden*, have fully confuted this vulgar error in the particulars following. When the hives have been for a year or more filled with combs down to the floor, and there is no more room to build, they yet carry of this said matter in the greatest plenty; and even when no more wax is wanting, only to seal up the honey, and the breeding cells, for which a very small quantity is sufficient.

Further: do but examine the said matter with your fingers, and you will presently perceive the particles to separate from each other, and crumble to powder, whereas wax, on the contrary, will adhere and cleave together: or if you carry it to the fire you shall see it turn to ashes and dust, when the other shall melt and dissolve. A plain evidence it is not wax!

The diversity again of it's colours is an additional proof of what I am disputing for. Sense itself is an evidence.

† *Nat. Delin.* p. 106,

vidence. Wax, both as it is gathered, and wrought into combs, is always white, as any person may easily satisfy himself, and nothing but the age of the combs, and breath of the Bees, changes it's colour.

Moreover, it is easy to observe, that new swarms for the first, second or third day, carry in little or nothing of this said matter ; when in that space of time, they have (invisibly) conveyed into the hive sufficient quantities of wax, formed into several large combs. On the contrary it is certain, that when they carry in most abundantly of the said matter, they collect the less wax, and the reason is plain : the new swarms want the wax, and the old stocks want food and nourishment for their young.

This might satisfy any person that this is not wax, yet I will add a further proof. For several seasons after I became a Bee-master, I was very desirous and diligent to find out how, or where, they brought home their wax, well knowing that gross matter to be of a very contrary nature, and applied to some other use, but was not able, for a considerable time, to enter into the secret.

At last, viewing a hive of Bees very busy at labour, I observed one Bee among the rest as she fixed upon the alighting place, of an unusual appearance ; upon which I seized her directly, before she had time to enter the hive ; where, with a very sensible pleasure, I found what I had (till then) been in vain searching for. Upon the belly of this Bee, within the plaits, were fixed no less than six pieces of solid wax, perfectly white and transpa-

rent

rent like gum; three upon one side, and three upon the other, appearing to the eye equal in bulk and gravity; so that the body of the Bee seemed duly poised, and the flight not in the least obstructed by any inequalities.

Here have I found it at other times; and once I took away eight pieces together, and I knew that it was wax, and nothing else. Will not this pass for demonstration? some, who have wrote upon these insects, have observed, when the Bees return to their hives laden with wax, in order to disburden themselves, they give notice to their companions, when three or four come, and take each a small quantity of the wax with their jaws; and after them several others, who take their share of the lading, till no more remains; and then these porters go back into the fields to fetch more.* A Bee at work on the combs, requiring honey, it is offered her by another coming home, and she receives it with her trunk without spilling. For what reason (honey being at hand) I know not.

I only reply, I believe not the report, (tho' it might be that author's opinion) since all my observations of Bees have never discovered any such practice among them.

And tho' I am far from affirming it as matter of fact, yet I propose it as my humble opinion, that those very Bees that gather the wax, do also themselves manufacture, and frame it into combs. It seems to me most reasonable so to think. But I leave every reader to his own judgment.


CHAP.

* *Bradley*, p. 240, 247.



C H A P. VI.

Of the Swarming and Hiving of Bees.

“  HE principal reason why they swarm is
 “ the want of room. Therefore in co-
 “ lonies, where they are not at all strait-
 “ ened, they seldom or never swarm,
 “ except (says Mr. *Rusden*) thro’ distaste, disturbance,
 “ or mismanagement.

“ And in hives they swarm not merely for want of
 “ room, without other concurring circumstances ; such
 “ as a king in readiness ; multitude of subjects, prof-
 “ pect of plenty ; together with weather, which is in-
 “ viting.

Every swarm is composed of all the three sorts, *viz.*
 a Queen, great numbers of common Bees, both old and
 young, and Drones, whose numbers are uncertain ; some
 swarms have more of these than others. Dr. *Butler* is
 of opinion, that those swarms which have most Drones
 will most surely prosper, but I doubt it, till I see it pro-
 ved.

The multitude of swarms does not predict or promise
 the prosperity of an apiary. Witness the last summer ;
 in which I had no less than 86 or 87 swarms ; a conside-
 rable number of which at *Michaelmas*, had not honey
 half enough to maintain them till the spring. The

The old stocks also sending forth such multitudes (swarming most of them twice, and many of them three times) they were greatly reduced in strength and in store. Many about the country are already dead, both old and young; and no doubt but many more will yet die.

Neither do the earliest swarms always prove the best, or prosper most, as early as the latter end of *April*, or the beginning of *May*. The weather often afterwards is very wet and cold, shuts them in, and prevents so long their labours, that I have frequently known even these, either totally destroyed, or exceedingly reduced.

But swarms at the latter end of *May*, or beginning of *July*, shall prosper, and answer the owners expectation.

Three years ago I had a swarm upon *Midsummer-day*, which laid in a sufficient store of provision for their support, till the spring following, and they swarmed that summer, either the last day in *May*, or the first of *June*, and every summer since.

And it is more than 20 years since I had a swarm the beginning of *July*, which stood thro' the ensuing winter and prospered well.

When you observe your hives well replenished with Bees, and begin to lie forth about the hive's mouth in the day-time, and go in at night, and also the Drones appear, you may expect swarms, especially if the weather be clear, calm, and warm; for in a cloudy, wet, and stormy season, the first swarms seldom or never rise, tho' the casts, or second swarms, often rise in indifferent weather.

And

And whenever you see them gathering together in little clusters upon the hive, or stool, you may infer they are preparing and even ready for a dance; and may expect them to rise presently.

Get your hives in readiness, and of different dimensions, that you may the better suit them to the swarms. To over-hive them will be a great disadvantage. If under-hived the prejudice is the less, and it is easy to give them enlargement.

An hive holding three pecks, or two pecks and an half, will be a fit size for an early swarm of eight or ten thousand Bees. An hive of less measure will be large enough for those that come later in the year, and in less numbers.

It may perhaps be of some service here to acquaint the reader with an experiment I made in *October 1743*. when putting the Bees of a small and late swarm, into an empty hive, and afterwards upon a table, I took a particular account of their measure, weight, and number; in measure a quart, in weight one pound and a quarter, in number two thousand. I first imprisoned the Queen, and having a person at hand to assist me in the operation, particularly in counting them over, which took up the greatest part of the time, we had gone thro' the whole trial, and perfectly finished it, before the least sign of life could be seen in one single Bee. But in a few minutes more, some signs of life began to appear first in their moving legs, and then in other parts; upon which I put them into another stock, where they are still in being.

From

From hence it is easy to compute the number of Bees in a swarm, of four or five pounds in weight, *viz.* eight thousand, or upwards; proportionable to which would be an hive of such an extent.

Your hives thus at hand, you may dress them agreeable to your own fancy. I rub mine only with a small handful of fennel, dipped in a little ale sweetened with sugar; sometimes with nothing at all, except it be a new hive.

It is a common practice with most to place sticks in the hives, the better, as they suppose, to fasten the combs. But if your hives are of a right form, and narrower at the mouth than the middle, I see not any the least occasion for such a precaution. The Bees will themselves effectually secure the combs from falling.

Besides, you will gain this advantage by this means, *i. e.* taking out the combs full of honey, in a manner entire, and not broke in pieces.

The two principal swarming months are very well known to be *May* and *June*. As to the hour of the day it is not certain; I have known them to rise near eight in the morning, and after four in the afternoon; but most generally between eleven, and one or two. It might not be amiss to have a watchful eye upon them a good part of the day. And now be sure to give them door-room enough, opening the whole passage for them, tho' it be a week or ten days before the swarm comes.

As soon as your swarm is settled, hive them to prevent any other joining with them. The method of hiving them, you will learn from their place and manner

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of settlement. A twig or small branch you may gently cut off with a sharp knife or saw; or shake them into the hive, setting it down upon a cloth, ready spread upon the ground, with a little stick placed across to bear up one side, to give them the liberty of passing in and out.

If you shake them into an empty hive, and many (as is usual) return to the place, repeat the action as often as there is occasion; knocking them out of the empty hive upon the cloth, you will with pleasure see them croud to their companions in the other hive, like sheep into a fold.

But if they settle, as sometimes, upon the body or large arm of a tree, &c. the best way is with a brush, or a little handful of small branches, to sweep them into the hive.

Being thus fixed in a new habitation, in the evening when they are all within and quiet, carry them to the place you have appointed for them; leaving them no passage into or out of the hive, but only at the door, which may be gradually reduced to a narrower compass.

When they are swarming, and dancing a *Levalto* in the neighbouring cloud, I never entertain them with any sort of musick, as do the country people, which drowns the delightful and more melodious sounds of the Bees. Nor is it of any service.

I have often known the Queen fall upon the ground, not being able to fly, thro' some defect in her wings; then the swarm returns home again; and the next time they rise, they have another Sovereign. I have known

the

the swarm stay in the hive near a fortnight before they rose again; and perhaps waited for a leader. Sometimes they rose no more.

The poor disabled, unhappy Princess I have picked up in the grass, but never without some attendants, whom nothing but violence could separate from her.

Their Language.

AS to the time of second swarms, we (generally) fix it to a day or two, and know when to expect them, by means of those distinct, peculiar, and musical notes, which are always heard two or three days before they rise.

Bees certainly have a language among themselves which they perfectly understand, tho' we do not, or at best very imperfectly. Eight or nine days after the prime swarm is departed, one of the young Princesses, addressing herself in a very humble and submissive manner to the Queen-mother, petitions for leave to withdraw, and erect a new empire, with a select body of the populace.

The Regent for a time seems silent, and for a day or night there is no answer, nor any grant given; however, the young Princess (bent on a crown and kingdom) continues her suit, and at last succeeds. The second night you may hear the Queen, with a very audible voice (being an eighth) giving her royal grant, and proclaiming it as by sound of a trumpet thro' the whole kingdom. Her voice is a grant, her silence a denial. And the day

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following

following (the weather being tolerable) you may expect the swarm.

It is delightful to attend to those peculiar and musical sounds or notes, being an eighth or chord, which is truly harmonious. Dr. *Butler* has taken pains to shew us the compass the song contains in the gamut, or scale of musick: the Queen composing her part (or bass) within the four lower cliffs; and the Princess hers (a treble) in the four upper cliffs. The swarm ready to come forth, the notes are louder, quicker, and more constant. When the greater part of the swarm is out, the musick is at an end, and we hear no more. Sometimes the royal grant is revoked, and then all the royal issue are slain.

As every general rule has an exception, I must tell my reader, that the second day of *June* 1716. after a swarm was come out, that very evening, and the two following, they gave notice for a second swarm, which rose the fifth day, when I joined them to the first. That night, and the next, they called as before, and rose twice; I returned them both times, at each taking a Queen from them: a few days after they rose a third time, settled, yet went home again. Finally, they rose a fourth time, when I took two Queens from them, putting them back to the old stock, after which they came forth no more. I mention this as being very singular, and what I never observed before, nor since.

I very perfectly remember, tho' many years ago, I heard these previous notices given for a first swarm, which are exceeding rare (that being the only time I ever took knowledge of them) and in a colony too; where
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placing my ear close to the top of the uppermost box, I could very easily and distinctly hear the least noise, and what was acting about the throne. And just as the swarm began to rise, there seemed to be the greatest lamentation among the branches of the royal family. Notes of woe expressive of the deepest sorrow, as tho' they were taking an eternal farewell of one another.

With the second swarm two of the royal Princesses go forth very often, and sometimes three, in hopes to gain a kingdom. That Princess, who is so happy as to get the throne first, is proclaimed Queen, and crown'd; the rest are all slain, as I have found them the next morning.

It is very seldom I keep these second swarms, well knowing they seldom answer any good purpose, except two or three are joined together. Besides, the old stocks greatly suffer thereby; for which reason I frequently return them, knocking them out before the old stock. I would advise others to do the same, which would not a little help the old stocks, and in the end turn to the advantage of the owners. And taking their Queen from them, they would not be so apt to rise again.

To put two casts together has little difficulty in it, especially if they come the same day; it is only at night fixing the mouth of one of the hives upwards, and placing the other directly upon it, when one smart stroke with your hand will beat the whole body down into the under hive, which you must presently set again upon a cloth, that they may settle and compose themselves. After which put them in their place.

But so many and various are the circumstances about the swarming and hiving of Bees, that it is impossible to give directions in them all. Common prudence will direct in many cases ; and the rest must be learned by observation, practice, and experience.

In hiving swarms (if you are afraid of their stings) you may secure yourself by a thin veil over the face, or by washing it with the sweet liquid used in dressing the hive.

In a very hot season, when the Bees are more apt to strike, I have (tho' not often) put on such a veil ; but I have seldom been stung, unless accidentally I happened to crush one.

The last swarm I had a summer or two ago never settled at all, but crossing a wide street, they fled over the houses, and entering in at the side-piece of a back-building, found a passage into the funnel of a chimney, and had chose that for their habitation. Resolving to dislodge them from this place, I got a large quantity of combustible matter, fit for such a purpose, and set it on fire, which presently brought them to light. No sooner did the smoke begin to fill the chimney, but first we heard a strange uproar and confusion, and presently considerable numbers came down into the room, thro' the fire and smoke, and some perished therein, and the rest were let out at the window, but the main body escaped the way they entered, settling on the outside wall, whence we got them with some difficulty into an hive, in which they prospered some years, producing several swarms.

In

In the year 1717. one of my swarms settling among the close-twisted branches of a codling-tree, and not to be got into an hive without help, my maid-servant being in the garden, offered her assistance, to hold the hive while I dislodged the Bees.

Having never been acquainted with Bees, she put a linnen cloth over her head and shoulders, to guard and secure her from their swords. A few of the Bees fell into the hive ; some upon the ground ; but the main body upon the cloth which covered her upper garments.

I took the hive out of her hands, when she cried out, the Bees were got under the covering, crowding up towards her breast and face ; which put her into a trembling posture. When I perceived the veil was of no further service, she gave me leave to remove it. This done, a most affecting spectacle presented itself to the view of all the company, filling me with the deepest distress and concern, as I thought myself the unhappy instrument of drawing her into so imminent hazard of her life.

Had she enraged them, all resistance had been in vain, and nothing less than her life would have atoned for the offence.

I spared not to urge all the arguments I could think of, and use the most affectionate intreaties, begging her with all earnestness in my power, to stand her ground, and keep her present posture ; in order to which, I gave her encouragement to hope for a full discharge from her disagreeable companions.

I began to search among them for the Queen, now got in a great body upon her breast, about her neck, and up to her chin. I immediately seized her, taking her from among the croud with some of the commons in company with her, and put them together into the hive. Here I watched her for some time, and as I did not observe that she came out, I conceived an expectation of seeing the whole body quickly abandon their settlement; but instead of that, I soon observed them gathering closer together, without the least signal for departing. Upon this I immediately reflected, that either there must be another Sovereign, or that the same was returned. I directly commenced a second search, and in a short time, with a most agreeable surprize, found a second, or the same; she strove, by entering further into the croud, to escape me, but I re-conducted her, with a great number of the populace, into the hive. And now the melancholy scene began to change, to one infinitely more agreeable and pleasant.

The Bees presently missing their Queen, began to dislodge, and repair to the hive, crowding into it in multitudes, and in the greatest hurry imaginable. And in the space of two or three minutes the maid had not a single Bee about her, neither had she so much as one sting, a small number of which would have quickly stopped her breath.

How inexpressible the pleasure which succeeded her past fears! I never call to mind the wonderful escape, without a secret and very sensible pleasure.

This

This memorable escape, inspired her with great courage, confimilar to these bold, daring, and undaunted insects. That ever after she would resolutely undertake the most hazardous services about them.

April 30, 1737. I had a swarm, which swarmed again *June 22d* the same year.

Keep your hives as full of **Bees as you can**, for poor weak stocks will but disappoint you. And thus will you have little or no occasion for feeding.

How to order Bees in Hives.

AS soon as a swarm is put into an hive, they marshal themselves after their usual manner, leaving a vacuity or empty space in the height of the hive, to give the labouring Bees liberty to carry on their work.

They have indeed a commodious house, as a place of refuge and of rest, but no provision; many mouths, but no meat; and likewise all their winter-store to lay in. If then they would live, labour is absolutely necessary, and no time is to be lost.

The very day therefore their owner put them into an house, they begin to furnish it, to lay in food, and gather honey; as also wax, which is now for some time their principal employment, that they may have their magazines in readiness to receive the treasure.

This then being their time of harvest, prevent (to your power) whatever may incommode or hinder them.

All the month of *June*, and to the middle of *July*, let them have room enough for labour. Then begin to

straiten the passage ; for no sooner doth honey begin to fail abroad, but the robbers will be trying to break in and steal.

In the next month make the passage smaller still, so a few Bees will more easily guard it.

This is the worst month in all the year for robbing ; and therefore a strict and daily inspection and oversight is requisite.

The method I use is as follows ; which effectually prevents the entrance of the mice (their mortal enemies) and the sinking of the hive's mouth, when it is old, which often stops the passage, and shuts them in, greatly to their prejudice.

Take a square piece of deal above four inches long, and cut a door-way in it the length of three or four inches, and more than a quarter of an inch in depth, that a large Bee or Drone may easily pass it. Place this at the mouth of the hive, to be enlarged or lessened according to the season of the year, and as you see occasion.

When the hives are full of Bees remove it, and replace it after the swarms are come forth.

If in this, or the following month, you observe any hive daily attempted by robbers ; but especially if you find the Drones in an hive, after they are expelled all the other stocks, you have great reason to suspect the loss of the Queen, and consequently the total dissolution of the whole state ; and so the most prudent way will be to take them in time.

The month of *October* is the best for feeding Bees, or taking them for your use, either those stocks which are
very

very rich, or those that are too poor to stand till next summer without your assistance. Keep none that weigh not twenty pounds.

If you have not watering places near, set a trough of wood or stone in your garden, filled with gravel, and kept always moist, for them to drink.

Of Feeding of Bees.

FEEDING Bees is what I have no great opinion of, and very seldom practise; yet it may sometimes be necessary, as when new swarms are in want. Various are the methods used in feeding of Bees, as well as the materials; as sugar, salt, sweet-wort, &c. which cannot be laid up for future supply.

Honey alone is their natural and proper food; and when there is a real necessity to feed any, give them no less than a pound, or two pounds at once, and repeat it, till you have furnished them with a sufficient quantity. This they will lay up in the cells for future store,

The manner of administering it may be this. Let your honey be brought to a due consistence, or a liquid, by water, or small beer mixed with it; then pour it into a vessel prepared on purpose, or into an empty comb, a Drone-comb (being strongest) is the best; and in the evening when all the other Bees are quiet, gently raising the hive on one side, put it under; and the next day they will, with the greatest cheerfulness convey it into the magazines.

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If you give it in some other vessel, some precautions will be necessary to prevent drowning themselves in it. At such times be sure to keep the passage or door strait, for fear of robbers. It would not be amiss to feed in a cloudy, misty season, when the Bees stir least abroad; and begin to feed them in time. I never gave less than a pound and an half, or two pounds together.

If in spring they need any further help, let them not want; the gathering season being at hand, when they will be able to help themselves, and reward your kindness and compassion.

Several times I have saved them, even at the last, when not a Bee was able to come down, by dropping a spoonful of liquid honey among them in the combs; and afterwards offering them what was wanting.

The common, but cruel method of taking hives, at this season of the year, is by burning with fire and brimstone. To which I can by no means be reconciled, and here in this publick manner protest against, preferring to it fumigation; whereby with safety we may become possessors of their treasure. But that will be considered in a chapter by itself.

The way of driving Bees, in order to come at their honey, I utterly dislike, and am an enemy against, because the honey must be foul and corrupted; and what is worse still, great numbers of young brood (the best of the Bees) utterly destroyed, and by that means those stocks greatly reduced and endangered.

In *October* and *November* take particular care to secure their winter-quarters, that neither the weather, nor other enemies, hurt them.

In

In the end of *January*, or in *February*, lift them gently from the stools, and cleansing the filth, set them again in their place. And if your ground will allow, let them stand a full yard distant from each other, and not too great numbers in one garden; for by that means I had no less than seven swarms the last summer, which settled all together.

Of the Honey-Dew.

WHAT the honey-dew is, is disputed among the learned.* According to the ancients it was an efflux of air, a dew which fell upon flowers.

The moderns say it is rather a perspiration of the finest particles of the sap in plants, which evaporating thro' the pores afterwards condense upon the flowers.†

Pliny was much in the dark about it, and writes doubtfully of it, asserting, it was either the sweat of heaven, the spittle of the stars, or the moisture of the air purging itself.‡

Dr. Butler judges it to be the quintessence of all the earth's sweetness (*i. e.* of the flowers) exhaled, as other dews in vapours, into the lowest region of the air, by the continued and exceeding heat of the sun, and condensed there.§

And thence I have very often seen it descend, in a clear day, like an exceeding fine rain; and easily discerned

* *Mel roscidum.*

† *Nat. Delin. p. 108.*

‡ *Sive illud sit Cæli Sudor, sive quædam Syderum saliva, sive purgantis se Aeris Succus.*

§ *Butler's Fæm. Monar. pag. 111.*

cerned it against the light of the sun for many hours, if not a whole day together. The Doctor's reasons are these.

When the year is backward in it's fruits, the honey-dews are the same.

In hotter, and more southern climates, where the fruits and flowers are most forward, these dews are more timely. Also because those countries, which have the greatest plenty of the best and sweetest flowers, have always the purest honey.

And certain it is, that the hottest and driest summers do produce the greatest and most frequent honey-dews. And in cold and wet seasons, few or none of them are to be seen.

It is the most generally received and prevailing opinion, that these honey-dews consist of vapours raised in the third region, and being thoroughly purged and digested by the heat of the sun, and condensed, fall down to the earth.

But as plenty of honey falls from above, so is there a native sweetness in plants, flowers, &c. whence the Bees carefully and constantly gather it; and as they extract it from the flowers, they do not (as some writers affirm) defecate, concoct, and refine it; but as nature produces it, they fill their little bags with it, immediately transport it to their hives, and discharge it into the magazines; which done they go back for more.

Much less do Bees make the honey, tho' some tell us the dew is not honey, except it be gathered by the Bees, concocted in their bodies, and condensed by their heat in the combs.

And

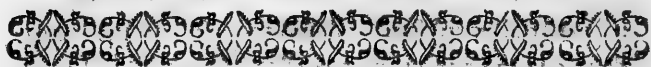
And it is the opinion of many authors, that there is no material or substantial difference between the honey-dew, and the ancient manna of the *Israelites* in the wilderness.

The Manna fell on the ground like hoary frost, was gathered early before the sun waxed hot, and tasted like wafers made with honey, which shews some similitude and agreement betwixt them.

Honey was the sugar of the ancients, and the *Romans* used it in their feasts.*

* *Purchas's Theatre* p. 155.





C H A P. VII.

Of Bees Wars and Robberies.

HERE is not any thing relating to these insects, that has given me so much uneasiness and labour, as their martial spirit, striving to enrich themselves, at the expence and ruin of their neighbours.

Not that they are influenced by, or act from a principle of cruelty or injustice; but their fighting and plundering of one another ought rather to be imputed, either to their perfect abhorrence of sloth and idleness, or to their insatiable thirst for honey; for when no honey is to be had among the flowers abroad, but only among their neighbours, they will venture their lives to get it there, and not a hive within their reach is left unassaulted. Now the trumpet sounds to arms, and these true sons of *Mars* prepare themselves for war. And many a terrible battle have I beheld between the one and the other, and great multitudes quickly slain.

A few Bees perhaps at first find means to pass by the guard, and encouraged by repeated success, they return with fresh forces, constantly encreasing the number, till the invasion is too powerful to be opposed, and the hive is entirely ruined.

The

The eleventh of *August* 1716. my little daughter came running to me, (being in company,) and told me the Bees were swarming; but I guessed them to be robbers, which I presently found true upon entering the garden; where I beheld a dreadful battle, and great numbers dead upon the walks, having broke at once into several hives. Nor was there one stock or colony left untried, tho' in all about thirty. Here I had employment enough. Immediately I stopped up two of them very close, and by other means, in less than an hour, I secured all the rest, and the robbers disappeared.

The end of *July* 1743, taking a walk to one of my apiaries, I no sooner heard the noise of the Bees, but I was persuaded they were employed in theft and robbery, and presently found they had violently assaulted seventeen hives in another Bee-garden at a small distance. Great numbers were broke into one of them, and carrying out honey with little or no opposition, which I directly secured. Upon that, they fell upon the two next with the utmost fury, and in vast numbers, which obliged me to shut up them also, and cover most of the rest. When for the space of an hour, or more, I had a very warm encounter with the robbers before I could force them to retreat. At night I opened the passages, and gave the thieves liberty to return home.

The next morning they made a fresh and very vigorous assault, but I was then prepared for them, being sure of this second visit; when after another smart conflict, I gained a compleat victory, after which they returned

turned no more in that hostile manner. That stock which suffered most is now safe, and in all probability will prosper.

Hence may the reader take direction how to act in similar cases : instantly stop up such hives till evening ; then discharge the strangers. Keep the stock close shut up the next day, which will give you a fair opportunity of engaging the robbers by themselves, and effectually prevent further attempts. Yet provided they should afterwards return, when your doors are again set open, disturb the true Bees by a bunch of stinking madder fastened to the end of a little stick of a convenient length, till they begin to shew their resentment ; then will you see them seize the robbing Bees, and tumble them down in the greatest wrath ; so that you may assuredly infer their safety. They will best defend themselves. But at the time you are thus employed, it is needless to give you a caution to take care of yourselves. But should your hives thus attacked have but a few Bees, and little honey, it is better to take them, than stand a trial.

I never lost any stocks by the robbers but once, which was occasioned purely by my absence ; paying a visit at *Woodstock*, at my return I found two hives in a manner ruined, and took what little honey was left in them.

I have at other times been a witness of fatal battles, of more than two days continuance, occasioned by a strange swarm forcing their way into a single hive or colony.

Also

Also two swarms going together sometimes quarrel, till great numbers have been destroyed, or one of the Queens slain, which ends the contest, when the commons on both sides unite under the survivor.

All stocks of Bees, whether in hives or colonies, are so many distinct communities or kingdoms, and entirely independent. As such, they live in perfect peace and unity among themselves, but have no intercourse or friendship with one another, but rather live in perpetual enmity and wars.

It is ten thousand pities that such excellent and useful creatures should thus plunder and destroy each other. To prevent which, observe the foregoing directions.

Thus have we travelled with them thro' the several seasons; at the same time taking cognizance of their several sorts, together with their different offices and employments.

That of the Queen, both day and night for so many months together, must be very operose and laborious; her province must be very hard and difficult, tho' all is acted within doors. So large a family to raise and superintend, so prodigious a multitude of eggs to lay, which occasions her constant travel from cell to cell, and necessity of running the same round without the least respite, constant and impartial justice to be administered thro' the whole state, to every member of the body politick, must, one would think, be a great confinement and fatigue, and a station not very desirable; and yet all is discharged with the greatest regularity, cheerfulness, diligence, constancy and delight.

The employment of the commons is to gather wax, (which takes up most of the first week after the swarm) in order to build the combs; to fetch in honey, with necessary materials, as proper nutrition for the young; to keep guard, carry forth the dead, kill the drones, and cleanse the hives, &c.

Then the office of the drones is either procreation according to some, or hatching and hastening the young brood according to others. Yet these are but of short duration, few living above three months, others not more than two, and many not one. And the nymphs often dragged out of the cells before they are perfect, and cast out of the hive.





C H A P. VIII.

Of the Bees Enemies.



WHAT pity is it that creatures, of so great excellency and usefulness to mankind, should have any enemies; but certain it is they have many. The chief of which are as follow.

Some of their worst enemies we have considered in the preceding chapter, even those of their own species, none being more hurtful to them, except their cruel and merciless owners, who at once depopulate and utterly destroy, without the least compassion, whole kingdoms and empires. Both rich and poor stocks are here equally guilty, and try to augment their own store, tho' with the greatest difficulty, danger and dishonesty. Where they meet with little or no opposition, they grow bold and impudent, but a resolute and vigorous resistance makes them retire.

But if once thro' their numbers they storm the citadel, and the garrison is forced to yield (their chief design being to rob from others, and enrich themselves) they immediately fall to plundering the city, and transport the treasure into their own dominions; when the

true Bees are left inevitably to die thro' famine, which is far worse than sudden death.

Sometimes it is not only a single flock that is thus employed, but several are in arms at once, and not easily composed. I have before directed how to prevent this mischief.

Another enemy is the mouse, especially the field-mouse. These are dangerous, and destroy multitudes every winter in our kingdom; therefore carefully guard against them. I once lost a flock by this means, and only that once; they had made a nest among the combs, and bred young.

Keep the door therefore so close that a mouse cannot enter, and examine the hackle, to dislodge them from thence. An effectual preservative would be to place your hives so, that it may be impossible for a mouse to ascend; as many of mine are. Also place traps in your Bee-garden. I caught no less than thirty mice in one garden the last winter, and the same number of titmice.

The titmouse is a great devourer of Bees, ten or twelve being scarce sufficient for his breakfast, often returning for a fresh feast. Tearing the Bee to pieces, he eats the entrails, and drops the rest.

Frequently have I found him knocking at the door, when no sooner doth the poor innocent Bee appear to enquire what gave the alarm, but she is seized, and becomes his prey. The same enemy often seizes them when abroad. Shoot them, or set traps for them.

The

The house-lark, a little dun bird with a black bill, in summer time is the death of many Bees ; she watches near the hives or colonies, seizing them as they settle, and many times in flight, and carries them to her young. This bird builds her nest in the wall of an house, where I have often found it, and destroyed both old and young together.

The swallow likewise feeds her young with Bees, as I have found by dissection ; if possible destroy their nests.

The sparrow do them little or no prejudice, only feeding themselves or their young, with the white maggots, or the unripe nymphs cast out of the hive.

The moth is not the least enemy to Bees : concealing herself, she lays her eggs, which by the heat in the hive turn to worms or maggots, secreted at first in the skirts of the hive (which ought to be stopped with lime and hair) but afterwards getting into the combs, generally prove the ruin and destruction of the whole : for the Bees, not able to endure such disagreeable company, abandon their habitation, leaving the enemy in full possession. Destroy them if you can.

The spiders also destroy many, catching them in their nets at their return home, being heavy laden. They spread their nets about the hives, or colonies within the Bee-house, round the boxes, upon the walls, flowers or bushes, wherein the Bees are immediately entangled and killed. To preserve your Bees, dispatch the spiders, and break down their fatal and ensnaring nets.

Wasps are some of their worst enemies, by which many hives are entirely destroyed. They begin first with the dead Bees upon the ground, pulling them to pieces, and carrying them to their nests. Afterwards they grow more bold and impudent, and passing the guard they adventure into the hive, where sometimes the Bees seizing them, punish them with death, and directly bury them.

Wasps by nature are stronger than Bees, and better able to endure hardship; and when the cold weather comes they often despoil poor and weak stocks. I had one many years ago entirely demolished, being at a distance, and not under my own inspection.

In spring destroy to your power the great wasps at their first appearance. You will find them upon the gooseberries and currants when they blossom; here I have often caught and killed them. And by killing one of these you destroy a whole nest at once.

Once moving a Bee-stone in my garden, which had lain some time upon the ground, one of these wasps immediately took wing, and saved herself by flight.

Upon a very strict survey of the place, I espied a comb newly begun, in which there was five cells of an unequal depth, and in three of them there was young brood; the other two were empty.

Every one of these wasps singly and alone, without any second, makes a nest. Spare none of these; if you can by any means get them in your power, shew them no favour. Afterwards search for their nests, and when found, burn or scald them, which will be a signal service to your Bees.

Hornets

Hornets are also enemies, especially where they are numerous, yet not so dangerous as wasps. She flies about the colonies or hives, watching her opportunity, then seizes a Bee, and carries her away, as the hawk does the little bird.

It is two or three years since I found a nest of hornets under the eaves of a summer-house at the end of my colonies, which I took care to extirpate in time.

Earwigs or emmets are enemies to Bees. The former in the day time conceal themselves under the hackle, and in the night creep into the hive, and eat the honey. Sometimes I cover the top of the hives with ashes, to prevent their settling there. Let these with the other enemies be the objects of your resentment.

Again: tempestuous weather, with frost and snow, is often fatal to Bees. When the ground is covered with snow, suffer not your Bees to come abroad tho' the shining sun may invite and tempt them. The snow dazzles their eyes, amazes and confounds them so far, that they fall into it, and die presently. And stormy weather, with rain and hail, kills many, when they are out at labour.

The better to secure your Bees against bad weather, shelter your apiaries as well as you can from the east and north winds. Let them be also well fenced, that neither cattle nor fowl may hurt them.

If you at times find any chilled with cold, and dying, you may recover them with heat, as I have often done with delight, by putting them into an handkerchief, and breathing upon them; or by carrying them a while in

my pocket, and placing them in the sun-beams, or laying them before the fire. But if their vitals are impaired and hurt, and the animal spirits entirely dissipated, it is impossible to recover them.

Snails are doubtless an offence to them, and give them some trouble and disturbance, by reason of their slime and excrements. But whether they are any further detrimental or injurious, is doubtful.

A modern author has told us, a snail made bold to steal into one of his glass-hives. The porters at the lodge gave him but a scurvy reception. Their first salutations, with their stings, made him mend his pace. But the senseless creature, instead of making a retreat, marched forward into the middle of the hive; where a whole band set upon him at once, and killed him upon the spot. Upon which occasion there was a council immediately convened. It was beyond their strength to remove the carcase; therefore these shrewd politicians* argued and consulted the best method to prevent any infection arising from the putrified carcase, to which end they covered it all over with glue.

Here again I am constrained to disagree with the gentleman, and acquaint my readers, that very frequently I have seen snails within the boxes, and at the back-window, moving about, changing their situation, and continuing at times for several days together: but not so much as a single Bee assaulting the offensive animal, or offering the least resistance; but on the contrary, shunning, and flying from him.

I have
 * *Nat. Delin.* p. 104.

I have likewise oftentimes observed them coming out of the colonies, no way hurt or wounded, but in full strength and vigour, at which time I have apprehended many, and destroyed them.

Must we not then conclude the account given by that author as the production of a very luxuriant fancy, or the effect of great inadvertency?

Once more, what he writes of a grand festival on the Queen's progress through all her dominions, and of forming a large veil, behind which nothing can possibly be seen, and all in honour to her majesty's procession, passes with me more for fancy, than matter of fact. But I leave the reader to his liberty.

He also tells us of Bees in *France*, that journey three times a day two leagues from home; nay three leagues for agreeable provision. Such surely are possessed of some very peculiar excellencies.*

The last and worst enemies of all, are their most ingrateful owners, who annually destroy them by wholesale. To prevent this practice to the utmost of my power, I refer all my readers to the tenth chapter, which it is hoped will at once sufficiently direct, and effectually engage them in favour of such innocent, instructive, diligent, faithful, and profitable creatures.

Of the Age of Bees.

HERE also I find authors divided in their opinions. The life of Drones is short, being executed and cast out at the Queen's command; but the Queen being lost, I

* *Nat Delin.* p. 117, have

have known them live all the winter with the common Bees, and not killed with cold, contrary to what authors assert.

As to the age of the Honey-Bees it is disputed. Some take them to be mere annuals; others there are, who tell us they live many years.

By succession it is true they live several years in hives, as well as colonies; as did the Bees under the leads in *Oxford* over *Ludovives Vives's* study, where they continued from 1520 to 1630.

Mr. *Mouffet* supposes they may live thirty years; and says he knew a stock that continued in the cieling of the Dutchess of *Somerfet's* house more than three decads of years, and questions whether they die of age at all.

The *French* author says they live seven or eight years, and sometimes longer. By succession I have known them live that number of years in hives, and advise none to keep them so long a time.

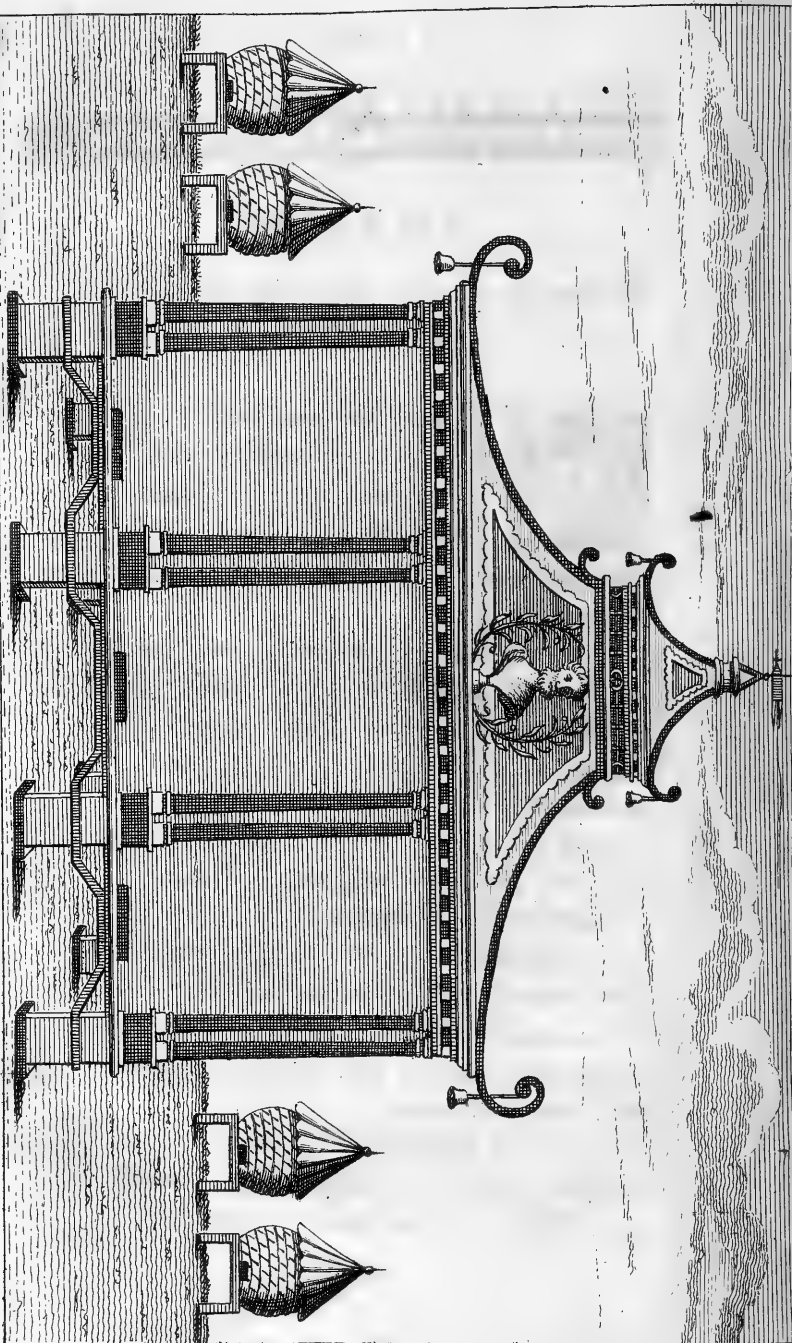
Dr. *Butler* affirms it, that a Bee is but a year's bird, with some advantage: and others say her age is but a year at longest. I am well assured great numbers of them die annually thro' hard labour. Observe with some strictness an hive of Bees in *July*, and you may perceive many amongst them of a dark colour, with wings rent and torn, and in *September* not one of them to be seen; and it is my opinion that a Bee lives no longer than two summers; yet that is a long life, if compared with the wasps, the drones, or the silk-worms. Why then should they not be suffered to live out all their time?

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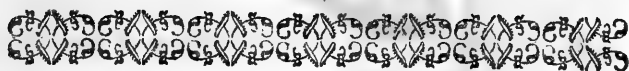
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A Chinese - PALACE for BEES.



C H A P. IX.

Directions for the right Management, and best Improvement of Bees in Colonies.



R. Jeddie first contrived this method, for which he had a patent from King Charles. Many more, and much greater are the advantages arising from Bees kept in colonies, than can be gained in the common way of hives. For instance :

The certain preservation of so many thousands of these noble and useful creatures; which surely should not be esteemed the least. Thus you every year reap the delicious fruits of their indefatigable and faithful labours, and yet have all their lives secured.

Once I took a box, with every cell in it full of honey, and most of all sealed up; wherein I found only two common Bees, and one drone.

Another advantage is their strength (which consists in their numbers) and by consequence their greater safety. By this means they are better able to defend themselves against their enemies (the robbers) and preserve both their lives and fortunes.

Yet I have known (tho' not often) colonies in good state, as well as hives, invaded, but not vanquished. A little assistance has put them out of danger.

A third

A third advantage arising to the owners in this method, is their wealth and riches, by means of their united labours. This necessarily turns to the greatest profit of the proprietor.

I have in some summers taken two boxes from one colony filled with honey, and yet sufficient store left in the other two boxes for their maintenance, each box weighing forty pounds; and allowing ten pounds for each box, with the wax, &c. there must be sixty pounds of honey for the Bee-master; which at 6*d.* a pound is 1*l.* 10*s.* But it really is of more worth, because of the goodness and superior excellence of the honey, the far greater part therefore being pure virgin-honey, and perfectly neat and fine.

Besides all this, the liberty and pleasure of viewing them and inspecting them at all seasons, summer and winter, even in the busiest times of gathering, with the greatest safety.

Neither do they require (as the hives) a constant attendance in swarming time.

This method so compassionate, and yet so useful, contributing both to profit and pleasure, must appear greatly preferable to the other, and far more eligible.

It might be added, they must also be effectually secured from wet and cold, mice and other injuries.

The Form of the Boxes, with Directions how to make them.

DEAL, being spongy, is most proper, and sucks up the breath of the Bees sooner than what is more solid; yellow, dram-deal is the best, thoroughly seasoned.

An

An octagon, being nearest to a sphere, is the best form; since as the Bees in winter lie in a round body in or near the center of the hive, a due heat is conveyed to all the out-parts, and the honey kept from candying, which in a square would not be so effectually prevented, and is many times prejudicial to the Bees, and sometimes proves their ruin. Thus much for the materials.

The dimensions of my boxes, and which I would on so long a trial recommend to others, are in depth ten inches the inside, the top-board a full inch; and the breadth within twelve or fourteen inches.

Any gentleman, who chuses boxes of a larger extent, may order the depth a full foot, and the breadth within sixteen inches, not forgetting to make the house proportionable.

I have tried boxes containing a bushel and more, but found them not to answer the design like those of a lesser size. The larger are not so easily managed; they are much longer in filling; so that it is later e'er you come to reap the fruits of their labours; the first year you must not expect it, perhaps not the second neither, nor will the honey be so good and fine.

The best and purest honey is what is gathered the first five or six weeks, which is worth 1s. a pound. And in boxes of less dimensions, (planted as hereafter directed) provided the season be at all favourable, you may take in a month, or little more, a box full of the finest honey; and in an extraordinary season the same colony will spare you two boxes, reserving what will be sufficient for their own support.

For

For the top of the box, an entire board would be best, or else two boards very firmly glued together, and a full inch thick when planed, and at least an inch more in breadth than the dimension of the box, which, in the management of the colonies, you will find to be an advantage; the edges underneath may have a little mould, merely for ornament's sake.

In the middle hereof must be an hole five inches square, for a communication between the boxes, covered with a sliding shutter (of deal or elm) running easily in a groove, over the back-window. The eight pannels or squares nine inches deep (and three parts of an inch thick when planed) are to be let into the top so far, as to keep them in their proper place; secured at each corner with plates of brass, and at the bottoms cramped with wires to keep them firm; since the heat in summer will try their strength.

A glass window behind, fixed in a frame, with a thin deal cover, two small brass hinges, and a button to fasten it. Here you may inspect into your colonies and see their state, employment, prosperity and improvements, with pleasure and safety, at any season.

Front doors to your colonies, and two glasses to one box, I am sensible are of so little service, and attended with so many inconveniencies, that I utterly dislike them, and never use more than one, which I find well enough answers the design. Those who are otherwise minded may have more.

Two brass handles, on each side one, are necessary to lift up the box or boxes, fixed in with two thin plates

plates of iron, near three inches long, to turn up and down within the box, and put in three inches beneath the top-board, which is nailed close down with sprigs to the other parts of the box.

Those who chuse a frame within, to which the Bees may fasten their combs, need only use a couple of deal sticks of an inch square, placed across in the box, and supported by two pins of brass, one an inch and half below the top, the other two inches below it, by which means the combs will quickly find a rest. But if at the first plantation an hive is put into the house, together with a box, there will be no occasion for such supports.

One thing yet is wanting to perfect the work, *viz.* a passage for the Bees to go in and out four or five inches in length, but in depth less than half an inch. Now we are in readiness for an house.

A Description of the Bee-House, for six Colonies.

IN keeping Bees in colonies, an house is necessary, or at least a shed ; without which the weather, especially the heat of the sun, would soon rend the boxes to pieces.

Your house may be made of any boards you please, but deal is the best ; let the materials be of what sort you please, the house must be painted, to secure it from the weather.

The form and dimensions of the house are these ; the length thereof full twelve feet and an half. Each colony should stand a foot distant from the other.

The

The height three feet and an half, to admit four boxes together. If only three boxes be employed, two feet eight inches.

The breadth two feet on the inside. The four corner posts to be made of oak, and well fixed in the ground, that no stormy winds may overturn it, and all the rails of oak, supported by several uprights of the same, before and behind, that they may not yield or sink under 6, 7, or 800 weight or upwards. The floor of the house (about two feet from the ground) should be strong and smooth, that the lowest box may stand close to it.

This floor may be made with boards or planks of deal the full length of the Bee-house; or, which I prefer, with a board or plank to each colony, of two feet four inches long, and fixed down to the rails; and that part which appears at the front of the house may be cut into a semicircle as a proper lighting place for the Bees, which plane down, that the wet may fall off. When this floor to a single colony wants to be repaired, it may with ease be removed, and another placed in it's room, without disturbing the other colonies, or touching any other part of the floor.

The interspaces may be filled with other pieces of boards, or planks of an equal thickness, which will last for many years. I only propose this, leaving the reader to his choice.

Upon this floor, at equal distances, all your colonies must be placed, against a door or passage cut in the front of the house.

Only

Only observe further, to prevent any false step, that as the top-board of the box (being a full inch broader than the other part) will not permit the two mouths to come close together, you must cut a third in a piece of deal of a sufficient breadth, and place it between the other two, so close, that not a Bee may get that way into the house. And fixing the said piece of deal down to the floor with two lath-nails, you will find afterwards to be of service, when you have occasion either to raise a colony, or take a box of honey, and may prove a means of preventing a great deal of trouble and mischief.

The house in this forwardness, you may cover it to your own mind, with boards, fine slates, or tiles. But contrive their position so as to carry off the wet, and keep out the cold, rain, snow, or whatever might any way prejudice and hurt them.

The back-doors may be made of half-inch deal, two of them to shut close in a rabbet, cut in an upright pillar, which may be so contrived, as to take in and out, by a mortise in the bottom rail, and a notch in the inside of the upper rail, and fastened with a strong hasp. Place those pillars in the spaces between the colonies.

Concluding your house made after this model, without front doors, a weather-board will be very necessary to carry the water off from the places where they settle and rest.

Good painting will be a great preservative. Forget not to paint the mouths of your colonies, with different colours, as red, white, blew, yellow, &c. in form of a

half moon or square, that the Bees may the better know their own home. Such diversity will be a direction.

Thus your Bees are kept warm in the coldest winter, and in the hottest summer greatly refreshed by the cool air, the back-doors being set open without air-holes made in the boxes.

How to furnish the Colonies with Inhabitants.

AN House thus fitted up, the next thing is to furnish it with inhabitants. The best time to plant your new colonies, is either the spring (*March* or *April*) or in summer (*May* or *June*) according as you determine to begin with a stock of Bees, or with swarms.

If the first, let it be a new stock (a last year's swarm) rich in honey, and full of Bees. No other are fit for a colony. Poor and weak stocks will but disappoint you.

But if you chuse the latter (which I should rather recommend) procure two swarms, if possible, the same day, and put them together into two boxes, or an hive with a box, and at night place them in your house, and with a knife, and a little lime and hair, stop close the mouth of the hive, or upper box, that a Bee may not be able to go in or out, but at the front door, which is to be their only and their constant passage.

If you occupy none but boxes, you will in a week or ten days time, with pleasure, see the combs appear, and filling with honey; but if it be an hive you will see nothing till they have wrought down into the box.

I never employed an hive in this method but once, which proved so disagreeable, and so difficult to remove, that I have ever since used boxes only. Never

Never plant a colony with a single swarm; as I have sometimes done, but with little success. But your united swarms will yield you a box of the purest honey at the end of *June*, or beginning of *July*, which makes a very great difference. Here is both profit and pleasure, with a quick return.

When the second Box, or the box under the hive, appears full of Bees and combs, it is a proper time to raise your colony in the dusk of the evening, when all the Bees are at home, in manner following.

Place your empty box, with the sliding shutter drawn back, behind your house, near the colony to be raised; and near the height of the floor, by the help of another empty box upon the ground; then lifting up the colony with what expedition you can, set it down upon the empty box, with the mouth of the colony close to the piece of wood nailed upon it (as before directed) that not a Bee may get out thereat.

This done (immediately with or without an assistant) lift the hive and two boxes, or the three boxes, into the house again, putting them in their proper place. If afraid, you may make use of a thin veil during the operation.

Directions how to take the Straw-Hive or Box.

WHEN by the help of the back-windows, you find a sufficient quantity of honey, and sealed in the middle box, and the lowest box half full of combs, also few Bees in the uppermost box, proceed thus:

At or about five o'clock in the afternoon, drive close the sliding shutter, under the hive or box, to be taken from the colony, with a mallet. If the combs are new, you may force the shutter home without that instrument, with your hand; be sure it be close, that no Bees may ascend into the hive or box to be removed.

After this shut close the doors of your house, and leave the Bees thus cut off from the rest of their companions for the space of half an hour, or more. In this space of time, having lost their Queen, and other company, they will fill themselves with honey, and be impatient to be set at liberty. Then opening the back-window, you will see them in the greatest hurry and tumult, running up and down, attempting one way or other to disengage themselves from so disagreeable an imprisonment.

If in this interim you examine the box or boxes beneath, and observe all composed and quiet there, then you may be confident you are so far right, and the Queen is in safety. Hereon raise the back part of the hive or box, so far, by a piece of wood, or other material thrust underneath, as may give the prisoners room to come forth; who taking wing will return to their fellows; delightful to behold! then lifting the box from off the colony, turning the bottom upwards, cover it with a cloth all night; and if any Bees be left in it, let them out the next day, and they will return to the colony.

Thus have you an hive or box of honey, and all your Bees saved; which will recompence you by their future faithful labours.

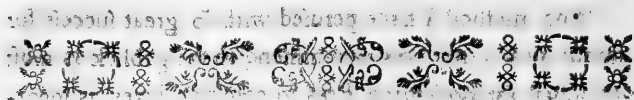
Provided

Provided it is an hive which you take, and with any considerable number of Bees in it, you may drive them out into an empty hive, as some writers have directed.

Placing an empty hive in a bucket with the mouth upwards, lift the hive from the colony upon the other, tying a cloth presently about them, turning the bottom hive to the top, which done you may carry them to some distance, and by a stick strike smartly all round the bottom hive, disturbing the Bees in it, stopping at times, to give them liberty to ascend. Be sure not to shake the upper hive, during the operation, but keep it firm and steady in it's place. When you perceive by the noise of the Bees, they are got up, carry the hive, and knock the Bees out on the ground, or upon a cloth spread upon it, with one end fastened to the lighting board, when they will go to the colony.

But as I never place a straw-hive in a house or colony, I have no such trouble to come at their treasure. Never raise a colony after the tenth of *July*, and take away the lowest box, if it is not at least half filled with combs.





CHAP. X.

Containing full and plain Directions, how to preserve the Lives of those most valuable Insects, when you become Masters of their Treasure.



THE preservation and improvement of Bees in colonies, has been no secret, since Mr. *Jeddie's* happy invention. And how effectually to promote the said ends in the way of common hives is the design of this chapter.

From the long observation I have made of these very wonderful creatures, and their inimitable excellencies, together with their great usefulness to mankind, I am become one of their greatest admirers, and a publick advocate for them. Most solemnly protesting against all that notorious ingratitude of their cruel owners, who not content with all their treasure (collected with infinite pains, and many perils) devote them to destruction without any distinction, to their own great loss.

Is no regard due to these creatures of God, which are so excellent in themselves, and serviceable to men? when the following pages will make it appear, with how little trouble, and without any expence, the owners may come at their riches, with safety to their lives; those who shall hereafter doom them to the common death, must be altogether without excuse.

The

The method I have perused with so great success for many years, and now recommend to the publick as most effectual for preserving Bees in common hives, is incorporation, or uniting two stocks into one, by the help of a peculiar fume, or opiate, which for a time will put them entirely in your power to divide and dispose of at your pleasure. Yet know that dominion over them will be but of short duration, therefore you must be expeditious in the operation.

You must know the Queen or commanding Bee perfectly well, which you are immediately to search for among the multitude, to apprehend and imprison, returning her no more to her beloved and most loyal subjects. Search among the Bees which you destroy by brimstone, whereby you may learn to know her.

No new swarms or stocks should be thus united, except very late ones, and casts, which have not gained a sufficient quantity of honey for their winter store. Such I always unite, to save their lives.

Hives or stocks, which have swarmed once or twice, consequently reduced in their numbers, are the fittest to be joined together, which will greatly strengthen and improve them.

Nevertheless, if you have a stock both rich in honey, and full of Bees, which you are desirous to take, it is but dividing the Bees into two parts, and put them into two other hives, instead of one.

I must add one precaution more under this head, *i. e.* examine first that stock, to which you design to join the Bees of another, whether there is honey enough in it, to

maintain the Bees of both; it should be full twenty pounds in weight, the heavier the better.

Of the Materials, or Manner of Operation.

I am now to inform my readers what the materials are, and after that the manner of operation.

The narcotic, or stupifying fume, is the *Fungus maximus*,* or larger mushroom, commonly known by the name of bunt, puckst, or frogcheese; it is as large or larger than a man's head. I had one of these brought me the last summer (unripe and white) which weighed some pounds; but when ripe, of a brown colour, and turning to powder, they are exceeding light.

Shepherds and herdsmen, &c. frequently find them in the fields, and will supply you with them, towards the latter end of the season.

When you have procured one of these pucks, put it into a large paper, pressing it down therein to two thirds, or near half the bulk, tying it up very close. Put it into an oven some time after the household bread is drawn, letting it continue all night. When it will hold fire, it is fit for your use in the method following.

With a pair of scissars cut a piece of the puck as large as an hen's egg (better at first to have too much than too little) and fix it to the end of a small stick, slit for that purpose, and sharpened at the other end, which place so, that it may hang near the middle of an empty hive. This hive you must set with the mouth upwards, near the flock you intend to take, in a pail or bucket.

* *Fungus pulverulentus.*

This done, set fire to the puck with a candle, and immediately place the flock of Bees over it, tying a cloth round the hives, (which you must have in readiness) that no smoke may come forth. In a minute's time or little more, you will with delight hear them drop like hail into the empty hive. When the major part of them are down, and you hear very few fall, you may beat the top of the hive gently with your hand, to get as many out as you can. Then loosing the cloth, lift it off to a table, or broad board, prepared on purpose, and knocking the hive against it several times, many more will tumble out, perhaps the Queen among them, as I have often found lodging near the crown. She often falls one of the last.

If she is not there, then search for her among the main body in the empty hive, putting them forth upon the table, if you discover her not before.

During this search, you must proceed after the same manner with the other hive, with which these are to be united. No sooner are those Bees composed and quiet, and you have found and secured the Queen, but you must put the Bees of both hives, together in one, mingling them thoroughly together, and sprinkling them at the same time, with a little ale and sugar, putting them among the combs of the latter hive, and shake them down in it. When they are all in, cover it with a cloth, bound close about it, and let them stand all that night, and the next day shut up, that a Bee may not get out. Some time after you will be sensible they are awaked out of sleep. The same night would be best to put them in
their

their proper place, and if you had another garden, where in to fix them, I would recommend it.

The second night after the union, in the dusk of the evening, loosing the string, move the cloth from the mouth, (taking care of yourself) and they will with a great noise immediately fall forth; but being too late to take wing, will go in again: then putting in two pieces of tobacco-pipes, to let in air, stop them close in as before, and keep them so for three or four days longer; after which you may leave the door continually open.

But in taking away the cloth you must use discretion and caution, since they will for some time resent the affront and offensive treatment.

The best time of the year for union is after the young brood are all out, and before they begin to lodge in the empty cells, which they do in great numbers in cold weather and winter-time, tho' Mr. *Rusden* denies it.*

As to the hour of the day I would advise young practitioners to do it early in the afternoon, that having the greater light, they may the better find out the Queen. The few Bees left in the hive suffocate with sulphur. I never knew such combined stocks conquered by robbers, and they will either swarm the next summer, or yield you an hive full of honey. A little practice will make you perfect.

As one view of such an operation would form a more perfect idea of the whole transaction, than what the ablest pen possibly can; if any gentleman, or others, are desirous to see the performance, the publisher freely of-

fers

fers that, or any other service in his power, in which he can oblige them.

If the directions contained in this history are diligently and constantly observed, I durst almost engage for the prosperity of your Bees, whether in colonies, or common hives.

*How to make Mead, not inferior to the best of foreign
Wines.*

Put three pounds of the finest honey to one gallon of water, two lemon peels to each gallon; boil it half an hour (well scummed) then put in, while boiling, lemon peel. Work it with yeast, then put it in your vessel with the peel, to stand five or six months, and bottle it off for your use.

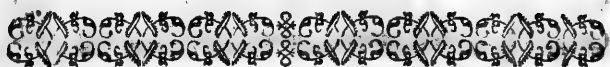
N. B. If you chuse to keep it several years, put four pounds to a gallon.

POSTSCRIPT



POSTSCRIPT.

PERSONS who chuse to keep Bees in glass hives must get a swarm in *May*, or at the latest, the middle of *June*; hive them in the evening in a box or flat-top'd straw hive, place them where you intend to keep them, then uncover the hole at the top, and place the glass over it; see that it fit so close that no Bees can come out but at the bottom of the hive or box; the Bees will soon begin their work in it, the glass must be covered with an empty hive or cloth, that too much light may not prevent their working. In a good season I have had a glass filled in thirty days, containing thirty-eight pounds of fine honey. When your glass is compleatly filled, slide a tin-plate between the glass and the box so as to cover the passage, and in half an hour you may take off the glass with safety. What few Bees remain will readily go to their companions. Any Gentleman or Lady whose curiosity may incline them to see the method of managing Bees, may inspect Mr. *N. Thorley's* apiary, any Thursday or Saturday in the afternoon, at Ball's pond, near Newington-green turnpike, where, and at his shop, opposite the Mansion-house, London, may be had all sorts of hives, in glass, wood, or straw, ready for use, and all sorts of English and Foreign honey.



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Directions to the Book-binder.

Place the plate of a Glass-hive before the title, and the plate of a Bee-house before page 139.

T H E E N D.

THE END OF THE WORLD

